

142 F.Supp.2d 831
United States District Court,
W.D. Michigan,
Southern Division.

KALAMAZOO RIVER STUDY GROUP, Plaintiff,
v.
EATON CORPORATION, Defendant.

No. 1:95-CV-838.
|
May 9, 2001.

Synopsis

Association of companies who released polychlorinated biphenyls (PCBs) to environmentally contaminated site filed action against eight potentially responsible parties (PRPs), alleging that they contributed to PCB contamination, and seeking to recover response costs under Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Michigan Natural Resources and Environmental Protection Act (NREPA), and common law theories. The District Court, 3 F.Supp.2d 799, granted summary judgment for one PRP, granted partial summary judgment for second PRP, and, following bench trial, ruled in favor of second PRP on remaining claim. Association appealed. The Court of Appeals, 228 F.3d 648, reversed and remanded. On remand, the District Court, Robert Holmes Bell, J., held that: (1) evidence supported finding that PCB discharges from two of PRP's automotive parts manufacturing plants reached river, but (2) there was insufficient evidence of PCB discharges from PRP's third plant.

Ordered accordingly.

Procedural Posture(s): On Appeal; Motion for Summary Judgment.

Attorneys and Law Firms

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Richard A. Glaser, Dickinson Wright, PLLC, Grand Rapids, MI, for Menasha Corp.

OPINION

BELL, District Judge.

This contribution action under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 ("CERCLA"), 42 U.S.C. § 9601, *et seq.*, came before the Court for a bench trial on the issue of liability as to Defendant Eaton Corporation for discharges of PCBs to the Kalamazoo River ("the River") from its three facilities in Battle Creek, Kalamazoo, and Marshall, Michigan.

This Court previously granted summary judgment in favor of Eaton with regard to its Kalamazoo and Marshall facilities, and ruled in favor of Eaton with regard to its Battle Creek facility after a bench trial. The basis for those rulings was that the evidence was not sufficient to show that any of the three Eaton facilities had released sufficient quantities of PCBs to satisfy the "threshold of significance" standard.¹ The Sixth Circuit reversed this *833 Court's rulings with respect to all three facilities on the basis that this Court applied an incorrect liability standard to the CERCLA contribution action. *Kalamazoo River Study Group v. Menasha Corp.* ("KRS v. Menasha"), 228 F.3d 648, 650 (6th Cir.2000).² The Sixth Circuit instructed that a § 113(f) contribution plaintiff, like a § 107 plaintiff, is not required to show any direct causal link between the waste each defendant sent to the site and the environmental harm. *Id.* at 655–56. The Court advised that consideration of causation and other equitable contribution factors is proper only in allocating response costs, not in determining liability. *Id.* at 656. Thus, for purposes of this liability action, the relevant inquiry is whether Eaton discharged any PCBs to the site, regardless of the quantity. *Id.* at 658. "[O]ne discharge [of PCBs] is sufficient to support liability; there is no requirement that the generator typically discharge waste to the site." *Id.* at 660 n. 7.

A bench trial on the issue of liability was held on February 17–19, 2001. This Court has considered the testimony of the witnesses, the evidence introduced at this and the previous trials, the deposition testimony that was admitted into evidence, the parties' stipulations, and the parties' proposed findings of fact and conclusions of law. In light of the evidence and the Sixth Circuit's articulation of the relevant standard, the Court finds that Eaton is liable under § 113(f) with respect to the Battle Creek and

Kalamazoo facilities, but not the Marshall facility. This opinion contains the Court's findings of fact and conclusions of law, in accordance with Fed.R.Civ.P. 52(a).³

I. BACKGROUND

Plaintiff KRSO is an unincorporated association of four paper companies: Millennium Holdings, Inc. (formerly HM Holdings, Inc./Allied Paper, Inc.) ("Allied"), Georgia-Pacific Corporation ("Georgia-Pacific"), Plainwell, Inc. (formerly Simpson-Plainwell Paper Company) ("Simpson"), and Fort James Operating Company, Inc. (formerly James River Paper Company) ("James River").

Defendant Eaton Corporation is an Ohio corporation. At all relevant times, Eaton owned three automotive manufacturing facilities near the Kalamazoo River, in Battle Creek, Kalamazoo, and Marshall, Michigan.

In 1990 the Michigan Department of Natural Resources (now the Michigan Department of Environmental Quality) ("MDNR" or "MDEQ") determined that a three-mile portion of Portage Creek and a thirty-five mile portion of the Kalamazoo River from its confluence with Portage Creek downstream to the Allegan City Dam (the "Site") were heavily concentrated with PCBs. The Site was placed on the National Priorities List ("NPL") by the United States Environmental Protection Agency ("EPA") pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605. The MDNR identified three paper companies, Allied, Georgia-Pacific and Simpson as potentially responsible parties ("PRPs") for *834 the PCB contamination. These paper companies entered into an Administrative Order by Consent ("AOC") which required them to perform a Remedial Investigation and Feasibility Study ("RI/FS") at the Site.⁴ The MDEQ has required the PRPs, as part of the RI/FS, to extend their investigation upstream and downstream of the NPL site to include a ninety-five mile stretch of the Kalamazoo River from upstream of the Eaton Battle Creek facility to Lake Michigan.

For a more comprehensive factual background on the parties, the history of this NPL Site, and the nature of PCBs, refer to this Court's previous opinions⁵ and the Sixth Circuit's opinion in *KRSO v. Menasha*, *supra*.

II. BATTLE CREEK FACILITY

The Sixth Circuit held that on remand, the district court should re-evaluate the liability of Eaton-Battle Creek under the proper standard. *KRSO v. Menasha*, 228 F.3d at 661. The Sixth Circuit's reversal of this Court's finding of no liability with respect to the Eaton-Battle Creek facility was predicated upon the legal standard applied by the Court, and not on this Court's factual findings. For purposes of this second liability trial, however, the parties agreed to allow limited additional evidence with respect to the Battle Creek facility. In light of the new evidence and legal standard, the Court will amend and restate its findings of fact and conclusions of law with respect to the Battle Creek facility.

Prior to its demolition in 1984, the Eaton Battle Creek facility was located at 463 North 20th Street, Battle Creek, Michigan. The plant was approximately one-half mile from the Kalamazoo River, upstream of the NPL Site, but within the area to be studied under the AOC.⁶

The Battle Creek facility was in operation from the early 1940s until 1983.⁷ At the Battle Creek facility Eaton manufactured parts for the automotive industry, including internal combustion engine valves and gears.⁸ During the 1950s Eaton also ran an Aircraft Division at the Battle Creek facility.⁹ Manufacturing processes at the Battle Creek facility included heat treating, forging, welding and machining.¹⁰ These processes involved the use of quench oils, cutting or grinding oils, and hydraulic oils.¹¹ Some of the heat treating involved temperatures as high as 2500 degrees Fahrenheit.¹²

There were no floor drains at the plant. Because the wood floors would swell and buckle if wet, Eaton took great care to keep water off the floor. Process oils were collected in drip pans under the machines and under the conveyor belts. Still, residual quench and cutting oils on parts and waste metals dripped onto the floors, and *835 the floors became greasy.¹³ While the machinery was in use it was common for the cutting, quenching, and water soluble oil to splash or splatter onto the floor, and for there to be oil standing on the floor at the base of the machines.¹⁴ Oil pipes leading to the machines sometimes leaked, and it was recalled that on one occasion a high-pressure hydraulic line burst.¹⁵

Hydraulic operations are nominally closed operations. The hydraulic systems had filters that kept the oil clean, so those oils were not thrown away.¹⁶ Nevertheless, in the normal life of a machine that used hydraulics, the hydraulic lines would need maintenance or would leak from time to time.¹⁷

When grinding fines and oils were vacuumed from the machinery reservoirs workers occasionally splashed oil from the hose onto the wood block floor. On one occasion multiple gallons of water-soluble oils were spilled onto the floor causing the blocks to swell and requiring replacement of the wood blocks.¹⁸

Oils that spilled onto the floor were either absorbed into the wood block floors or absorbed with a dry absorbent such as “Floor Dry” or “Speedy-Dry,” swept up and discarded with the non-liquid wastes rather than with the wastewater. The floors in the large aisles and open areas were also cleaned periodically with a scarifying machine that scraped up the oil residue on the floors.¹⁹ Spills of process oils were common enough that the Battle Creek facility purchased 2,000 to 4,000 pounds of dry absorbent each month to keep any spillage from leaking out from around the machines all over the floor.²⁰

The oils that collected in the pans beneath the manufacturing machines were pumped out and taken to the mud room where waste metals and sludges were separated. The waste oil was collected in a tank and the effluent was discharged to the sanitary sewer.²¹ Clifford Galen, plant manager from 1968–1973, testified that some of the drip pans were piped directly to either the sanitary sewer or the storm sewer.²²

Scrap metal was stored in open bins outside in the back of the plant, and resulted in some oil run-off.²³ During World War II, and perhaps later, employees dumped solvents, which had been used for cleaning oil off the valves, directly onto the ground in the plant back yard.²⁴ Storm drains outside the plant could have carried some of these oils to the Kalamazoo River.²⁵

Prior to the late 1960s Eaton had no wastewater treatment system other than a settling weir to settle out the grinding mud from the water soluble oils.²⁶ The Eaton ***836** facility discharged its wastewater to the City of Springfield Sanitary Sewer System and the City of Springfield Storm Sewer System.²⁷ Prior to the mid-1960s, both the storm sewer and the sanitary sewer discharged to a ditch which led to the Kalamazoo River.²⁸ It was not until the mid-1960s that the Springfield Sanitary Sewer System was connected to the Battle Creek Sanitary Sewer System.²⁹

The effluent that was being discharged into the storm sewer ran through a concrete pipe under Eaton’s property, and then entered an open ditch that led from Eaton’s property to the Kalamazoo River.³⁰ In 1967 the Michigan Water Resources Commission (“MWRC”) conducted a wastewater survey of the Eaton Battle Creek Plant and determined that the plant was discharging 2220 pounds of

oil a day to the Kalamazoo River via the storm sewers and the ditch.³¹ Although the wastewater problem was primarily concerned with the discharge of soluble oil in solution into the storm sewer and on into the Kalamazoo River, straight oils were also released to the River.³²

When he became plant engineer in the late 1960s, Clifford Galen observed oily sheens in the effluent and dark oily stains in the ditch that carried the wastewater to the Kalamazoo River.³³ Galen focused his attention on the problem of oils in Eaton’s effluent, and under his direction the process wastes were diverted from the storm sewer lines to the sanitary sewer lines.³⁴ Modifications to the oil disposal room eliminated 1500 to 2000 gallons of oil per day from the River.³⁵ Used lubricants and cutting oils were collected in storage tanks which were removed by a licensed industrial waste hauler for off-site disposal.³⁶ By December 1969 the amount of oil discharged in the Eaton plant effluent was reduced to 177 pounds a day.³⁷ In 1973 Eaton constructed an oil skimming pond to skim oil from its wastewater prior to discharge to the Kalamazoo River.³⁸

In a 1979 survey, Snell Environmental Group found that free oils and soluble oils were allowed to enter the sewer system untreated. The retention pond had a considerable free oil layer and the definite presence of soluble oils, and the effluent had extremely high oil levels. The survey team also found oil spill problems in the vicinity of the drum storage area, which would allow oils to drain into the yard drains.³⁹

Based upon the evidence presented there is no question that over the years Eaton discharged significant quantities of ***837** oil to the Kalamazoo River. The discharge of oils to the River, however, does not answer the key question of whether those oils contained PCBs.

Eaton did not retain documents dating back to the 1940s and 1950s with respect to what oils were purchased at the Battle Creek facility.⁴⁰ None of the former employees at Eaton’s Battle Creek facility, including its stockroom supervisor from 1965 to 1983, recalled any purchases of Monsanto oils.⁴¹ The only oils Eaton employees recalled being used in the plant were supplied by Shell, Arco, Texaco, Mobil, Amoco and Standard.⁴² There is no evidence to suggest that oils from any of these suppliers contained PCBs at any time.

However, based upon certain documentary evidence from Monsanto Corporation, the parties have stipulated that the Battle Creek facility purchased 1940 pounds of Pydraul A 200 from Monsanto in 1970 and an additional 645 pounds of Pydraul A 200 from Monsanto in 1971. This amounts to approximately 5 drums of Pydraul.⁴³ Pydraul, is a

hydraulic oil containing 100% PCBs.⁴⁴

PCBs were detected in Eaton's effluent on two occasions. In February 1972, the MWRC conducted a study of industrial effluents into various rivers of the state. The sample taken from the joint outfall from Eaton's Battle Creek facility and Clark Equipment Company showed 1.4 ppb of PCB Aroclor 1254.⁴⁵ In September 1972 the MWRC conducted a wastewater survey at Eaton's Battle Creek facility and found .24 ppb and .12 ppb of PCBs in the storm sewer as it left Eaton's property.⁴⁶ The MDNR concluded that the presence of PCBs in the wastewater indicated that Eaton's process wastes were obtaining entrance to the storm drain.⁴⁷

Because the storm sewer lines that were tested did not originate at Eaton and served areas outside of the plant, the 1972 PCB detections in the effluent cannot be definitively attributed to Eaton. In addition, the September 1972 test results must be viewed with some skepticism because the low levels reported were at the limit of detectability.⁴⁸

Notwithstanding the shortcomings of the evidence, the evidence taken as a whole suggests that if there were PCBs in the effluent, Eaton is the most likely source of those PCBs. The MDNR survey reveals that Eaton contributed more than 97% of the flow to the storm sewer, while upstream sources contributed only 3% of the flow.⁴⁹ Tom Matson, Public Works Director *838 for the City of Springfield, produced maps indicating that nearly all of the flow through the Eaton ditch came from Eaton. The only other contributors were the Clark buildings on the east side of 24th Street and storm water runoff from residential areas south of the Eaton facility.⁵⁰ While Clark manufactured hydraulic forklift trucks which could have used PCB-containing hydraulic fluid, Matson testified that Clark's principal manufacturing operations were conducted in buildings on the west side of 24th Street, and that wastewater from these buildings was discharged into sewers that led to a ditch west of the Eaton ditch, or to a storm sewer west past Helmer Road. They did not empty into the Eaton ditch. The four Clark buildings on the east side of 24th Street that shared the Eaton sewer line were used for administration, engineering, research and development, and trucking.⁵¹ In light of the uses to which the Clark buildings on the Eaton line were put, it is reasonable to assume that the PCBs found in the storm sewer are more probably associated with Eaton than with Clark. The only other contributor to the Eaton storm sewer was storm water runoff from residential areas within a several block area south of Eaton.⁵² Again, although it is not definitively established, this Court can reasonably conclude that the PCBs were more likely to have originated in the Eaton industrial facility than from

the road surface waters from the residential area.

In 1980 the MDNR monitored Eaton's wastewater discharge for a twenty-four hour period. The results showed no traces of PCB. The detection limit used was 0.1 ppb.⁵³ As a result of this test, the MDNR stopped testing Eaton's effluent for PCBs as a requirement for the NPDES permit. The MDNR determined that while occasional PCBs may be in the oils used in the plant, they only appeared at trace contaminant levels.⁵⁴

When the Eaton Battle Creek facility was demolished in 1983–1984, the MDNR requested Eaton to test the wood block floors for PCBs. Eaton was not averse to complying with the request as its employees had no reason to believe that there was any contamination.⁵⁵ Eaton hired Howard Laboratories to do the testing. Howard tested fifty-five of the approximately 2.8 million wood blocks on the floor: twenty-seven samples from under capacitors in Building C, eleven samples for background in Building C, six samples for background in Building A, seven samples from the heat treat area in Building B, and four additional blocks. All fifty-five samples tested showed the presence of PCBs in the range of 3.1 mg/kg(ppm) to 155 mg/kg(ppm). The dominant Aroclors were 1248 and 1254. The wood blocks which contained high oil content also contained higher PCB content. Of the fifty-one samples tested for specific Aroclors, Aroclor 1248 was found in forty-six samples, Aroclor 1254 was found in forty-one samples, Aroclor 1242 was found in four samples and Aroclor 1260 was found in three samples.⁵⁶

*839 Although Aroclors 1242, 1248 and 1254 were all used in hydraulic oils produced by the Monsanto Corporation, Aroclor 1248 is the Aroclor most commonly associated with hydraulics.⁵⁷ According to Dr. Crumrine, Aroclor 1248 was not found in anything other than hydraulic systems.⁵⁸ Aroclors 1254 and 1260 are the Aroclors that are expected to be found in conjunction with capacitors and transformers.⁵⁹ According to the testimony of Plaintiff's experts, Aroclor 1254 is the only Aroclor associated with cutting oils and quench oils sold commercially by Monsanto.⁶⁰

Based upon the test results, Eaton attempted to determine the source of the PCBs. Kenneth Manchen, an environmental engineer at Eaton, testified that the PCBs were randomly scattered throughout the facility, and that he was unable to detect a pattern in their disbursement.⁶¹ Stuart Lightfoot, the Director of Facilities and Plant Engineering, testified that although there were correlations between some of the higher concentrations of PCBs and the location of some of the capacitors, he was generally unable to find a pattern that established a relationship between the locations of electrical equipment

and the PCB contamination in the wood block floors.⁶² Manchen testified that because he did not observe any definable pattern to the PCBs in the wood flooring, he concluded that in all probability the PCBs must have come from hydraulic fluids used during the war years.⁶³

In 1981, VERSAR, an outside environmental contractor to USEPA, inspected the Battle Creek plant to document Eaton's compliance with PCB marking and disposal regulations. VERSAR found several slight leaks from transformers, but no leaks in the in-service capacitors. VERSAR sampled the cutting, quench and hydraulic oils from various tanks and machines in the plant and found no detectable levels of PCBs in those oils.⁶⁴ VERSAR did detect Aroclor 1242 at a concentration level of 7 ppm in the grinding swarf. Grinding swarf is the sludge created by the process of grinding metal parts. It usually consists of small particles of the metal part being ground, the grinding wheel or tool, and the cooling fluid used in grinding. Because VERSAR did not find PCBs in the process oils, Eaton personnel, after investigating, concluded that the PCBs in the grinding swarf likely were attributable to floor scrapings from the floor scarifier being mixed with the grinding swarf.⁶⁵

In August 1984 Eaton sent four soil samples to the Anspec Company, Inc., for PCB analysis. No PCBs were found in the samples from the north clay beneath sludge, the south clay beneath sludge, or the north sludge. PCB Aroclor 1254, at 8 ppm, was found in the south sludge.⁶⁶

***840** In November of 2000, Plaintiff's expert, Michael McLaughlin, took three samples of sediments from the drainage ditch leading from the Battle Creek facility. The three samples, B-1, B-2, and B-3, were within 100 feet of each other. Sample B-1, which was taken from a ditch between the railroad tracks and Lafayette Avenue, contained Aroclor 1254 at 12,000 ppb. Sample B-2, which was taken 15 to 20 feet north of B-1, contained Aroclor 1254 at 4,700 ppb, and Aroclor 1260 at 2,400 ppb. Sample B-3, which was taken on the north side of Lafayette Avenue, contained Aroclor 1254 at 14,000 ppb and Aroclor 1260 at 4,800 ppb.⁶⁷ Although Mr. McLaughlin sought to take samples near the junction of the ditch and the River, he was unable to locate the ditch along the riverbank.⁶⁸ The samples were all taken from a public right of way, and were subject to runoff from the nearby railroad tracks, Lafayette Avenue, and surface streets in the residential neighborhood south of the Eaton facility. Mr. McLaughlin could not state within any degree of certainty when the PCBs were deposited in the culvert.⁶⁹

If the Battle Creek facility were a source of PCBs, the ditch sampled by Mr. McLaughlin would be an area

where one would expect to find PCBs in the sediments.⁷⁰ However, Mr. McLaughlin did not sample any portion of the ditch between sample B-3 and the Kalamazoo River, which was 1500 to 1600 feet away. Eaton contends that even assuming the PCBs in samples B-1, B-2 and B-3 originated from Eaton, Plaintiff has failed to provide evidence that any such PCBs were actually transported to the Kalamazoo River due to the significant distance (one-third mile) between sample B-3 and the River. According to Eaton this failure is compounded by the lack of evidence of PCBs in the Kalamazoo River in the vicinity of Eaton's Battle Creek facility.

The experts are in agreement that PCBs in the water tend to settle out with the sediment in depositional areas. There are numerous depositional zones in the fifteen miles between Eaton's Battle Creek facility and Morrow Lake. If PCBs had been released from Eaton they would have shown up in these depositional zones. KRSG has not sampled either sediments or settleable solids immediately adjacent to the discharge point from the Eaton sewer to the Kalamazoo River. In fact, KRSG has not taken any sediment samples in the entire fifteen mile stretch of the River downstream of Eaton's Battle Creek plant. The closest sediment sample was taken in Morrow Lake, approximately fifteen miles downstream of the Battle Creek facility.⁷¹ Instead, for evidence of PCBs in the Kalamazoo River from Battle Creek to the Morrow Dam, Plaintiff relies on a 1971 MDNR study, the 1976 Wuycheck study, a 1988 MDNR study, and a 1999 MDEQ study.

In a July 1971 study of the Kalamazoo River, one water sample downstream of the Battle Creek facility, near Augusta, Michigan, indicated a total PCB concentration of 0.1 ppb. Because Plaintiff has not attempted to rule out other industries upstream as potential sources of the PCBs there is insufficient evidence to attribute this finding to Eaton's Battle Creek plant. According to Plaintiff's expert, Dr. Mark ***841** Brown, of Blasland Bouck and Lee ("BBL"), approximately 25% of the Kalamazoo River watershed (by water volume) is upstream of Battle Creek.⁷² Moreover, the sample could have reflected effluent from the Battle Creek Wastewater Treatment Plant which was located approximately one mile downstream from Eaton's Battle Creek plant.

For purposes of this Court's determination of Eaton's contribution to PCBs in the River, the Wuycheck data is perhaps the most relevant because it was undertaken in the mid-1970s, close in time to when PCBs were being used in industry. If PCBs had been released by Eaton as alleged by Plaintiff, they should have been detected in the Wuycheck tests. In 1976, John Wuycheck, an employee in the Biology Section of the MDNR, conducted an

“intensive” survey of both sediment and settleable solids (also known as suspended solids) in the Kalamazoo River. Of the six locations tested between the Battle Creek plant and Morrow Lake, the only positive sediment samples came from 35th Street in Galesburg (K-12), where he detected Aroclor 1254 at 1190 ppb, and Morrow Pond at Rosemont St. (K-13), where he detected Aroclor 1254 at 3140 ppb. These sites are approximately thirteen and fifteen miles downstream of Eaton’s Battle Creek facility. The sediment sample from the site closest to the Eaton Battle Creek plant, Stringham Road (K-8), was non-detect for PCBs.⁷³

The Wuycheck study also detected no PCBs in the suspended solids from the Stringham Road (K-8) site. It did detect PCBs at a level of 1140 ppb in suspended solids at Custer Road (K-9), approximately five and one-half miles downstream of the Battle Creek facility and at a level of 810 ppb at 38th Street in Galesburg (K-11), approximately eleven miles downstream of the Battle Creek facility. The detection of PCBs in the water column over five miles downstream of the Eaton Battle Creek facility also tells little to nothing about the Eaton Battle Creek facility. Since almost twenty-five percent of the watershed for the Kalamazoo River is upstream of Battle Creek, PCBs in the water column could be from unknown point sources, runoff, and air pollution. The Custer Road collection point was also within the plume of the Battle Creek Wastewater Plant. Furthermore, even though the settleable solids test is useful for determining the presence of PCBs in the water column, it is not helpful in determining the source, quantity or concentration of PCBs. In a settleable solids test the collection bottles are suspended in the water for a period of time during which particles from the water and organic film accumulates in the bottle and collects PCBs from the water column. Because the organic materials in the bottle tend to attract PCBs, the test may indicate an artificially high reading of PCBs.⁷⁴

In 1988 the MDNR tested the sediment at eleven locations between Battle Creek and Morrow Lake. Only one of the eleven sediment samples tested positive for PCBs. PCBs at a concentration level of 1000 ppb of Aroclor 1254 were detected at one location downstream of the Battle Creek facility and 0.3 kilometers upstream of the discharge point of the Battle Creek Wastewater Treatment Plant.⁷⁵ The sediment *842 tests from the remaining ten locations were all non-detect for PCBs.

Plaintiff KRSG contends that the lack of positive tests for PCBs in the 1988 study is deceptive and should not be relied upon to show the absence of PCBs in the River because the MDNR used a high detection limit of one part per million (1000 ppb). Plaintiff’s argument ignores the

burden of proof. This Court will not guess what the use of lower detection limits might have shown. Plaintiff bears the burden of proof on the issue of Eaton’s contribution to the PCBs in the River. If Plaintiff was dissatisfied with the available studies, Plaintiff could have done its own studies of this portion of the River.

The experts were in agreement that PCBs are normally found in greatest concentration in depositional areas closest to the source. Plaintiff would like the Court to infer that the sediments might have been disturbed or blown out by floods or the removal of dams on the River. This theory is not supported by the evidence. Eaton’s expert, Dr. Connolly, sampled the sediment in Morrow Lake for a form of Cesium, an element deposited by the atmospheric testing of nuclear weapons beginning in 1954. The Cesium analysis revealed that Morrow Lake sediments have remained virtually undisturbed since before 1954.⁷⁶ The sediments in Morrow Lake are accordingly a reliable source of information on PCBs that were historically released to the River.

The MDEQ’s recent sampling of the River water similarly adds little support to Plaintiff’s case. In September and October 1999, the MDEQ collected water column samples from various locations in the Kalamazoo River. Two of the samples are of particular interest in this case. One sample was taken just downstream of the Ceresco Dam, upstream of Eaton’s Battle Creek and Marshall facilities. Another sample was taken at the 35th Street Bridge in Galesburg, just upstream of Morrow Lake. These two locations are approximately thirty miles apart. PCBs were detected at levels of approximately 3.5 parts per trillion at both locations. Because there are depositional areas between those two points in the River, this data indicates that there is no evidence of PCBs fluxing from sediments in the region between the Ceresco Reservoir and Morrow Lake. If there were sources of PCBs upstream of Morrow Lake, one would expect to see the concentrations increase, and to be higher at the downstream station. The PCB level detected, 3.5 ppt, is a relatively low level of PCBs. It is typical of levels observed in precipitation in the Great Lakes area, and typical of PCB levels in rainwater or snow. Studies of rainwater in the Great Lakes region indicate PCB levels in rainwater ranging from 1 ppt to 7 or 8 ppt. PCB levels of 2–4 ppt are found in remote lakes in Ontario, Canada.⁷⁷

In March 2000, the KRSG initiated a Surface Water Sampling Program in the Kalamazoo River. Sampling locations included one station near Galesburg, downstream of Eaton’s Marshall and Battle Creek facilities. Samples were taken every two weeks from March through July of 2000. PCBs were not detected in any of the eleven water column samples. The detection

limit used was six parts per trillion. Ten additional water column samples were collected during elevated flow in the River when sediments from the bottom of the River would likely be resuspended and transported downstream in the water column. PCBs were not detected in any of those samples, either. Dr. Connolly testified ***843** that if there were PCBs in the sediment he would expect to see them in the water column, particularly during a high flow event where sediments would likely be resuspended off the bottom. According to Dr. Connolly, the Kalamazoo River data indicates no detectable releases of PCBs from Eaton's Marshall or Battle Creek facilities, or any other facilities between Marshall and Morrow Lake.⁷⁸

The KRSF's fish data taken from 1993 to 1997 in the vicinity of Battle Creek showed PCB concentrations of .04 ppm to .14 ppm, with a single value outside of that range, which was at .24 ppm. These numbers are consistent with the earlier sampling done by the MDNR in 1987 in the Ceresco Reservoir, upstream of Eaton's Battle Creek facility, where they found PCB levels in fish at levels ranging from .02 to .12 ppm. Both the levels found by the MDNR as well as the levels found in KRSF's more recent sampling are similar to levels found at background sites. These background sites are from around the country where there are no known PCB sources, and the only believed source of PCBs is atmospheric deposition. Downstream, within the Superfund site, the PCB levels in fish are considerably higher than they are in the vicinity of Battle Creek.⁷⁹

The information gathered from the River sediments, water, and fish is of primary relevance to the issue of allocation because it bears on such issues as quantity and frequency of PCB releases from the facility. It is of less importance in determining the discrete question presented here, i.e., whether any PCBs were released from the Eaton property to the River. However, it does have some relevance in determining which oils used at Eaton's Battle Creek facility contained PCBs.

Plaintiff suggests that because Aroclor 1254 has been associated with cutting oils and quench oils in the literature and in some heavy industries, because Aroclor 1254 was found in all areas of the plant where machining processes occurred, because Aroclor 1254 was found in the ditch leading to the Kalamazoo River, and because the highest PCB levels were associated with the wood blocks with the highest oil content, the only reasonable conclusion is that the process oils used historically in cutting and quenching operations at the Battle Creek facility contained PCB Aroclor 1254.

The Court does not find that such a conclusion is warranted. The evidence indicates that PCBs were not a

common additive in cutting and quenching oils. Although Monsanto marketed PCB-containing cutting oils, PCB-containing cutting oils were not commercially successful.⁸⁰ There is no reason to add PCBs to cutting oils, there is no chemically feasible way to add them to soluble oils, and there were many better and cheaper alternatives to adding them to quench oil.⁸¹ Dr. Howard, an environmental consultant who owned and operated chemical laboratories from 1971 until 1989, tested approximately 100,000 samples for PCBs. In that testing he recalled only one group of cutting oil samples, no soluble oil samples, and only two groups of quench oil samples that tested positive for PCBs.⁸² Plaintiff has not offered evidence to persuade this Court that Eaton's Battle Creek facility would have chosen to use PCB containing cutting and quenching oils.

***844** Due to the fact that not many wood blocks from the floor of the Eaton Battle Creek facility were tested, and the majority of the blocks tested were from the vicinity of transformers or capacitors that were thought to have contained PCBs, the testing of the wood block floors is not representative of the floor as a whole. The wood block floor testing is insufficient to show the widespread dispersal of PCBs that would be indicative of the use of PCBs in quench and cutting oils at the facility.

The evidence in the River also does not support Plaintiff's argument that Eaton used PCBs in its quench and cutting oils. In fact, the evidence from the Kalamazoo River supports the opposite conclusion that the discharge of PCBs was small and related to oils used in closed or nominally closed systems. The evidence shows that Eaton was discharging a ton of oil per day in the 1960s. The majority of those oils would come from its open systems, i.e., its cutting and quench oils. If those cutting and quenching oils contained PCBs, they would be expected to show up in the River sediments near or immediately downstream of the plant. There is no evidence of that. The Court is struck by the lack of evidence regarding PCBs at or near the outfall of the drain from Eaton to the River. As the party with the burden of proof in this matter, the Court would have expected KRSF to have presented some evidence of River contamination close to Eaton's Battle Creek plant.

The Court is also struck by the complete lack of evidence of Aroclor 1248 in the Eaton ditch or in the River between Eaton's Battle Creek facility and Morrow Lake. Since Aroclors 1254 and 1248 were both in the floor of Eaton's plant, one would expect that if Aroclor 1254 from the Eaton facility reached the River, Aroclor 1248 would have reached the River as well. Yet Plaintiff has come forward with no evidence of Aroclor 1248 in the ditch or in the River downstream of Eaton and upstream of

Plaintiff's members.

Upon reconsideration of the evidence produced at the first trial in light of the new evidence Plaintiff has produced at this trial, this Court abides by its initial determination that the evidence does not support a finding that the PCBs at the Battle Creek facility were related to cutting and quenching oils. Plaintiff has not shown that PCBs were necessary to Eaton's cutting and quenching processes. Plaintiff has not shown that Eaton purchased PCB-containing quench or cutting oils. Plaintiff has not shown PCBs in the River that would indicate the use of PCBs in open systems. Because Plaintiff is the party with the burden of proof, and because the PCBs at Eaton's Battle Creek facility can all be explained by reference to leaks from hydraulic and di-electric equipment, the Court finds that the PCB contamination at Eaton's Battle Creek facility is not attributable to the use of PCBs in quench and cutting oils. Rather, this Court finds that the PCBs at the plant are attributable to leaking transformers, capacitors and hydraulic systems.

Because di-electric and hydraulic systems are closed or nominally closed systems, the Court finds that the quantity of PCBs released in the waste oils was minimal. Still, it is fair to conclude that it is more likely than not that some very small quantity of PCBs probably found their way to the Kalamazoo River.

In the first trial Plaintiff offered no evidence that the PCBs had found their way to the ditch or to the River. Now Plaintiff has, for the first time, come forward with evidence of PCBs in the Eaton ditch. Eaton contends that Mr. McLaughlin's testing does not add anything of significance to KRSB's case against the Battle Creek plant because 1) the sediments sampled in *845 a culvert near the former location of the plant were taken from a public right of way to which anyone had access and which was subject to runoff from Lafayette Avenue and the railroad tracks; 2) Mr. McLaughlin could not determine when the PCBs were deposited in the culvert; 3) the Aroclors detected are commonly associated with di-electrics; and 4) the sample nearest the River was still approximately 1/3 of a mile away. Eaton contends that because KRSB has presented no samples from the riverbank where the Eaton ditch discharged to the Kalamazoo River, KRSB has failed to connect the dots and to show that a discharge at one location caused a response action at a second location.

Eaton's attempt to compare this case to *KRSB v. Rockwell Int'l Corp.* ("*Benteler*"), 171 F.3d 1065, 1068 (6th Cir.1999), is not persuasive. Unlike *Benteler*, there was no evidence in this case that the ditch was not an active water course connecting the facility with the River. To the

contrary, the evidence reveals the discharge of large quantities of effluent from Eaton, through the ditch, to the Kalamazoo River.

Plaintiff has established by a preponderance of the evidence that some small quantity of PCBs probably went to the River. Based upon Eaton's purchase of PCB-containing hydraulic oil, the presence of PCBs on the plant floor, the detection of PCBs in Eaton's effluent, and the detection of PCBs in the Eaton ditch, it appears to this Court that it is more likely than not that some of the PCBs from the Eaton plant found their way into the sewer system and to the ditch. Even if the bulk of the spills of PCB-containing di-electric or hydraulic oils was absorbed by the floors or swept up and discarded, some of the oil would probably have mixed with the process oils and found its way into the effluent from the facility. Although organics in the slow-moving ditch would have acted as a magnet and a trap for PCBs, the Court finds that some, albeit very few, PCBs would have found their way to the River.

While the new evidence does not change this Court's previous conclusion that there is insufficient evidence of a detectable or measurable discharge of PCBs from Eaton's Battle Creek plant into the Kalamazoo River, under the liability standard articulated by the Sixth Circuit, this Court is constrained to find that Eaton is liable for some PCB releases from its Battle Creek facility to the Kalamazoo River.

III. KALAMAZOO FACILITY

Eaton manufactured truck transmissions at the Eaton Transmission Division on Mosel Avenue in Kalamazoo, Michigan, from the mid-1950s until January 1984, when the plant was closed. Eaton was the sole occupant of the building. The plant was serviced by City sewer and water. The plant was located approximately a half mile from the Kalamazoo River.

The plant's processes included machining (cutting, turning and hobbing), heat-treating and polishing transmission parts such as gears, shafts, and housings, and assembling those parts into truck transmissions.⁸³ These operations required the use of water soluble cutting oils, synthetic cutting compounds, and quench oils.⁸⁴ There were no die-casting or forging operations at the plant.⁸⁵

Parts that went through the heat treat furnaces went into a

quench oil bath, and then were washed. When David Martin, *846 plant engineer at Eaton's Kalamazoo facility from the mid-1960s to the mid-1980s, first started at Eaton, the sewer lines from the heat treat department and from some of the manufacturing areas discharged to a catch basin, from which it was pumped to the Zantman drain. The oils that went into the drains were primarily the water soluble oils.⁸⁶

Parts were also washed after machining operations in other areas of the plant. Prior to the late 1960s, the wastewater from those operations, including waste oils, were passed through a decanter system, then discharged to the catch basin, the City sanitary sewers or the City storm sewers. The catch basin and some of the storm sewers discharged to the Zantman Drain. Other sewer lines discharged to the municipal sanitary system or the municipal storm water system. The catch basin removed some oils, but other than that there was no treatment before the water, mixed with oils, was discharged to the Zantman Drain, the sanitary sewer, or the storm sewer system.⁸⁷

During the manufacturing process, cutting oils, hydraulic oils and oil-based coolants commonly spilled onto the wood-block floors.⁸⁸ After a part came off a machine it would be placed on a spindle or cart. There was a pan under the carts, but oil was bound to splash and drip onto the floor. Most of the oil was lost while a machine part was in transit from one manufacturing area to another.⁸⁹ Enough oil dripped on the floor to require the use of large quantities of Floor Dry or Oil Dry.⁹⁰ Waste from the scarifier used to clean the floors was placed into one of several trash compactors, and fluids from some of the compactors would run into floor drains.⁹¹ Until the mid-1970s, the floor drains at the Kalamazoo facility led to either the Zantman Drain, the storm sewer, or the sanitary sewer.

Because oil was expensive, it was generally recycled and reused.⁹² Straight oils would be recycled or picked up by waste haulers.⁹³ Carl Baker, who started working at Eaton corporation in the 1950s, testified that quench oil, in particular, was continually reused, and he did not recall any spills of quench oils.⁹⁴ Hydraulic oils were filtered and reused. Although hydraulic lines would break periodically with a loss of two or three gallons of oil at a time, most of the time the oil went right into the cutting oil reservoir.⁹⁵ Some oil spilled on the ground outside the building. There was staining outside the heat treat area where the tankers would fill the tanks.⁹⁶ On occasion spills occurred when a chip operator was hauling chips, or when an oil line froze.⁹⁷ Some of the storm water from off the property went to the *847 catch basin, and was discharged to the Zantman drain.⁹⁸ Other storm drains went to the

municipal storm water system.⁹⁹

Metal shavings and trimmings were dumped into a collection pit outside of the plant. Oils were drained from the trimmings pooled on the ground under and around the pile.¹⁰⁰ Periodically the shavings were lifted off with a magnet separator, and the oil was pumped out and hauled away.¹⁰¹

The catch basin did not prevent all the oil from entering the Zantman Drain.¹⁰² In March 1965, the MWRC tested the water in the Zantman Drain and found that it contained oil in concentrations of 41 and 51.2 ppm. The MWRC advised that Eaton was responsible for the excessive quantities of oil in the Zantman Drain, and for the oil pooling in the swampy area north of Mosel Street. The MWRC further advised that "[t]he amount of oil being lost to the drain would undoubtedly create oil pollution problems in the Kalamazoo River were this drain to be cleaned out to the river."¹⁰³ The MWRC advised Eaton that it had to improve its waste control methods to correct the contamination of the Zantman Drain and groundwater.¹⁰⁴ Eaton acknowledged that as a result of the practice of emptying its metal shavings coated with cutting oil outside, "a great deal of oil accumulates in our yard which seeps into and at times of substantial rainfall washes into the drainage ditch."¹⁰⁵

The 1967 wastewater survey showed that Eaton was releasing oil at concentrations of 373 ppm, for an estimated release of 1332 pounds of oil per day. The MWRC noted that heavy deposits of oil had accumulated along the banks of the Zantman Drain and around the periphery of the waste ponding area. According to the MWRC, the major source of this oil is from parts washers in the heat treating department. The MWRC was also concerned that the oil pooled around the scrap metal pile could be washed overland into the Zantman Drain during times of heavy precipitation.¹⁰⁶

Eaton responded to the MWRC's concerns by making changes in its waste disposal system. A concrete pit was constructed to catch oil drippings from the scrap metal pile.¹⁰⁷ A free oil skimmer was installed at the outlet of the collection basin.¹⁰⁸ By the early 1970s most of the floor drains were plugged to prevent the *848 active disposal or accidental drainage of water and oil into the floor drains.¹⁰⁹ A clarifier was installed in the mid-1970s.¹¹⁰

All process water and cooling water was discharged to the collection basin or settling lagoon where sediment was allowed to drop out. In early 1974, Eaton advised the MWRC that it had recently completed construction of a detention pond for oil removal. "Both the storm drain and the process water which originally went to the Zantman

Drain are now directed to the detention pond.”¹¹¹ An oil skimmer was installed on the lagoon to keep the oil from being discharged to the Zantman Drain.¹¹² Free floating oils were skimmed and collected in a holding tank. Water from the collection basin was pumped into the Zantman Drain. The waste from the holding tank was pumped through a decanting system, with the wastewater going to the sanitary sewer and the oil being hauled away by commercial carrier.¹¹³ Despite the installation of the oil skimmer on the pond in the early 1970s, the skimmer did not prevent all oils from reaching the Zantman Drain.¹¹⁴

The Zantman Drain is a county drain under the jurisdiction of the Kalamazoo Drain Commission. Prior to approximately 1973 when it was reconstructed, the Zantman Drain was an open culvert that began west of the Eaton facility, came across to the east side of the Eaton facility, then turned north where it tied into the Richardson Drain. It went through a culvert under Mosel Avenue, through a 24 inch pipe under the Upjohn Building, then into an open ditch before discharging into the Kalamazoo River.¹¹⁵

There was not much contribution to the old Zantman Drain from upstream of the Eaton Kalamazoo facility. There was little evidence of a water course west of Burdick Street. Most of the land west of the Eaton facility was agricultural, so there was little industrial development that would have contributed to the Zantman Drain.¹¹⁶

In the 1960s and early 1970s there was concern that the Zantman Drain was inoperative due to construction over the drains, improper grading, debris, and plant growth. The obstruction caused wastewater to pond in a marshy area and to back up on the properties just north of Mosel Avenue. There was not much flow in the drain north of Mosel Avenue. There was only a trickle from the 24 inch pipe underneath the Upjohn Buildings through to the ditch on the north side of the Upjohn property. The minimal flow through the drain to the Kalamazoo River, however, would have increased during a heavy rain.¹¹⁷

***849** In 1973 the Zantman Drain was improved and relocated. The entire section of the drain between the Eaton facility and Mosel Avenue was enclosed in a corrugated metal pipe. The portion of the new drain north of Mosel Avenue was an open ditch, east of the former channel. The drain ran north from Mosel past the Southon Paper Company, then east across the back part of Southon’s property, then north along the railroad tracks to the River. Over 15,000 cubic yards of dirt were excavated for the open drain north of Mosel Avenue. That dirt was not hauled away. It was left on the banks or spread on neighboring property.¹¹⁸

In a 1965 study, Eaton was found to be discharging 433,000 gallons of wastewater per day to the Zantman Drain.¹¹⁹ In a 1968 study, Eaton was found to be discharging 459,000 gallons of wastewater per day to the Zantman Drain.¹²⁰ Given this magnitude of flow on a daily basis, Dr. Brown opined that it would be difficult to contain all the wastewater in the marshy area north of Mosel Avenue without some of that water flowing thorough the drain towards the Kalamazoo River.¹²¹ Heavy rains would also have carried water through the drain to the River.¹²²

There is no dispute that once the Zantman Drain was improved in 1973, effluent discharged by Eaton through the Zantman Drain did reach the Kalamazoo River. There is also no question that some oils were carried from the Eaton facility to the River. The NPDES permit itself allowed a daily maximum release of 10mg/l of oil from the Eaton Kalamazoo facility to the Kalamazoo River via Zantman Drain.¹²³ In a 1973 letter to Eaton, the Kalamazoo County Drain Commissioner stated that in his “recent inspection and observation of the Zantman Drain there seems to be an oil film on the water as it escapes into the Kalamazoo River.”¹²⁴ In 1974 and 1975, an engineering company noted that after a physical inspection of the Zantman Drain it found “a collection of oil on the water surface and adjoining banks where the water level has fluctuated.”¹²⁵ Although Eaton has suggested that the oils might be attributable to other sources, there is nothing in the historical record to suggest that Eaton ever objected to the Drain Commissioner’s implication that Eaton was responsible for oils reaching the Kalamazoo River.

The question for this Court is whether there were PCBs in those oils. There is no evidence of any testing of the process oils at the Kalamazoo facility that would indicate the presence of PCBs, and there is no testimony from any Eaton employee that PCBs were used in any of the process oils at the plant.¹²⁶ Duane Clarke began working for Eaton in 1967, and was the ***850** general foreman of machine repair from 1968 until the plant closed in 1985. He testified that he did not know of any PCB-containing oil used at the Kalamazoo facility. Most of the hydraulic oil purchased was Mobil. Clarke did not know of any reason why the oils used would have to have PCBs. The only PCBs Clarke was aware of were those in transformers or capacitors.¹²⁷

In the 1973 industrial wastewater survey the MWRC, for the first time, tested the effluent from Eaton’s Kalamazoo facility for PCBs. No PCBs were detected.¹²⁸ The industrial wastewater survey of 1976 similarly detected no PCBs in Eaton’s effluent.¹²⁹

In 1984, in connection with Eaton's sale of the Kalamazoo facility to Liberty Properties, Eaton tested seventy samples of the wood block floors. PCBs were found in the wood flooring in levels ranging from non-detect to 743 ppm. No distinction was made in the study between the various Aroclors. The floor map indicates where the samples were taken, and whether they were taken from the aisle, background, capacitors, or transformers. Of the sixty-nine samples taken, twenty-eight samples were below the detection limit. Only four samples contained PCBs in excess of 20 ppm, and all four of these samples were from locations near transformers or capacitors.¹³⁰

Stuart Lightfoot was manager and then director of Environmental Engineering at Eaton's Battle Creek facility for nineteen years. Sometime after learning about the PCB contamination of the wood floors at Battle Creek, he learned that there were also small areas of PCB contamination in the wood block floors at the Kalamazoo facility. He thought the cause of the PCB contamination was a leaking transformer and the heat treat oil quench operation.¹³¹

Lightfoot's testimony regarding the possibility of PCBs in the quench oil is not persuasive. Lightfoot did not test the quench oils at Kalamazoo. He merely assumed there might have been PCBs in the quench oil because the Kalamazoo facility heat treat department did not have automatic fire extinguishers on it.¹³² In light of the fact that the facility was operational until 1983, long after PCBs were no longer available in quench oils, the absence of fire extinguishers in the quench department tends to lead to the opposite conclusion, i.e., that the temperatures in the heat treat department were not high enough to require either PCBs in the quench oil or fire extinguishers.

After the Eaton Kalamazoo Plant was sold in 1984, an environmental due diligence investigation was performed by an environmental consultant, GZA, retained by the purchaser. The investigation included thirty-one soil and water samples. The only PCBs mentioned in the environmental report were those detected in the wood block flooring in the study conducted by Eaton.¹³³

In 2000 the MDEQ conducted Aroclor-specific testing at the Kalamazoo facility. PCBs were detected in soil, concrete, floor blocks and wipe samples. In contrast to *851 the testing of a limited number of wood blocks from strategic areas at the Battle Creek facility, the testing at the Kalamazoo facility was done in a variety of areas throughout the facility. Very few PCBs were detected in soils and no PCBs were detected in the groundwater.¹³⁴ The MDEQ's 2000 data shows a predominance of Aroclors 1254 and 1260. Aroclor 1260 was detected

primarily in wipe samples. It was not detected in any of the soil samples under or adjacent to the facility. Only one sample from within the building contained Aroclor 1248. Aroclor 1242 was not detected anywhere in the plant or on the adjoining property, except in one isolated sediment sample from the former settling pond.¹³⁵ Because there was no evidence of Aroclor 1242 in the building, this detection is probably explained by the fact that the settling pond was lined with paper mill sludge.¹³⁶

Dr. Brown testified that the detection of Aroclor 1248 at a fairly high concentration in a wipe sample (120 ppm) as well as the detection of PCBs in soils beneath the plant, in some cases as deep as fifteen feet or more below the concrete, indicate that the PCBs are more likely to have come from cutting oils or hydraulic fluids than from only capacitors and transformers.¹³⁷ Mr. McLaughlin testified that when he considered the distribution of samples and removed one anomalous transformer result and two anomalous capacitor results, there was no difference between the electrical samples and the background or aisle samples. According to Mr. McLaughlin, finding PCBs at depth beneath the heat treat department is an indication that these PCBs were in the quench oil. He also testified that PCBs of electrical origin do not typically migrate to such depths. From his consideration of all the data he concluded that the PCB detections were not principally related to capacitor and transformer leaks.¹³⁸

This Court agrees with Dr. Brown and Mr. McLaughlin's conclusion that in light of the detection of Aroclor 1248, the PCB detections cannot all be ascribed to capacitor and transformer leaks. While Mr. Barrick testified that there is a possibility that some electrical equipment could contain Aroclor 1248, the documentary evidence does not indicate that this application of Aroclor 1248 was recommended or advertised.¹³⁹ The Court finds that it is more likely that the single detection of Aroclor 1248 indicates the presence of PCBs in hydraulic fluid that leaked on the floor.

The Court does not agree with Plaintiff's assertion that the predominant Aroclors found at the Kalamazoo facility, Aroclors 1254 and 1260, are more likely to be attributable to PCBs in cutting or quench oil than to the oils from the di-electric equipment. Aroclors 1254 and 1260 are the same Aroclors one would expect to find in *852 electrical equipment. Dr. Brown conceded that the evidence of PCBs in the wood block floor at the Kalamazoo plant could be consistent with periodic leaks from transformers and capacitors. He also acknowledged that the presence of PCBs at depth can be explained by the use of detergents which would bring the PCBs down into the soil.¹⁴⁰ Mr. McLaughlin was unable to explain the absence of any PCBs detected in the chip storage area, where process oils would have drained off the metal chips

into the soils.¹⁴¹

The testing of the Eaton Kalamazoo facility in 1984 and again in 2000 revealed that the PCB concentrations were primarily of a low level, either non-detect or up to a few parts per million, in a sporadic pattern throughout the facility. The highest concentrations of PCBs were found near the electrical equipment areas.¹⁴² The lower levels of PCBs were found in the aisles and the background. There were no significant concentrations of PCBs in the vicinity of the quench baths or the machine tool areas where cutting fluids would have been used.¹⁴³ According to Eaton's experts, Dr. Lennard Wharton and Robert Barrick, the nature and dispersion of PCBs reflected the use of PCBs in capacitors and transformers. They testified that the patchy pattern of limited PCB contamination consistent with tracking the PCBs from the electrical equipment areas, and that it was inconsistent with the use of process oils containing PCBs in open systems such as cutting and quenching operations.¹⁴⁴

The MDEQ detected no PCBs in soil samples taken from the vicinity of the outdoor quench oil storage tanks.¹⁴⁵ Neither did the MDEQ find any PCBs in the chip storage area on the southeast corner of building where one would expect to find them if PCB-containing process oils dripped from the metal chips. The closest PCB detection to the chip storage area was a single detection north of the chip pile at the level of .53 ppm.¹⁴⁶

Although Monsanto literature describes the use of PCBs in cutting oils, PCB-containing cutting oils did not have widespread or common use. PCBs make a poor additive to cutting fluids because the chlorine in the PCBs is not sufficiently free to assist in the cutting process. The operations at Eaton's Kalamazoo facility did not require anything other than conventional cutting oils.¹⁴⁷

The most commonly used quench oil in American industry during the 1950s through 1980s was straight mineral oil. PCB-containing quench oils were about five times as expensive as mineral oils. There was nothing about the operations at Eaton's Kalamazoo plant, such as a risk of fire or ignition of quench oils, that would militate in favor of using PCBs in quench oil.¹⁴⁸

***853** This Court finds that given the relatively low level PCB detections, their concentration around the electrical equipment, the lack of PCB concentrations in the machining and heat treat areas, the lack of PCBs in the area of the chip pile, the fact that PCBs have never been detected as a constituent of the process oils used at the Eaton Kalamazoo facility, and Dr. Brown's concession that the distribution of the PCBs was consistent with leaks from electrical equipment, it is unlikely that the PCBs

found at Eaton's Kalamazoo facility were part of the open systems.

Having determined that Eaton's Kalamazoo facility more likely than not used PCBs in its di-electric equipment and in some hydraulic fluid, the Court must still determine whether the proofs show by a preponderance of the evidence that any of those PCBs found their way to the Kalamazoo River.

On December 7, 2000, Plaintiff's expert, Michael McLaughlin, sampled four locations in the vicinity of the former Eaton facility in Kalamazoo. He sampled two areas, K-1 and K-2, immediately southeast of the plant, as close as he could get to the location of the chip storage pile without trespassing on Eaton's former property. He described the location as being just east of the chip pile, and in the drainage swale between Eaton and the railroad tracks. In sample K-1 he found Aroclor 1260 at the level of 20 ppb. In sample K-2, nearby, he found Aroclor 1260 at the level of 370 ppb.¹⁴⁹

Mr. McLaughlin attempted to test the Zantman Drain in two locations. Sample K-3, was taken from the exit of an abandoned concrete culvert under the railroad tracks, a location he believed was near the outfall from Eaton's plant to the old Zantman Drain. At this location, almost one-half mile from the River, he found Aroclor 1254 at the level of 2000 ppb. Based upon the historical documents and his observations in the field, McLaughlin opined that there were no other sources for this PCB detection other than the Eaton facility.¹⁵⁰

Mr. McLaughlin also sampled an area north of Mosel Avenue, because he believed that if Eaton discharged PCBs, they would likely be present in the marshy area described in the historical documents. He could not find the marshy area. He did not know if the marshy area had been obliterated by the 1973 improvements to the Zantman Drain, or whether he just could not locate it. He took sample K-4 from a culvert which he believed to be where the old Zantman Drain went under Mosel. No PCBs were detected at this location. Mr. McLaughlin now opines that he must have been in the discharge of the new Zantman Drain.¹⁵¹

Eaton's expert witness, Robert Barrick, testified that Mr. McLaughlin's detection of low levels of Aroclor 1260 in the sediments at K-1 and K-2, was of little significance. The 20 ppb detection at K-1, in particular, was a low concentration near the detection limits for many routine analyses. The detection of Aroclor 1260 at K-1 and K-2 also failed to match any of the MDEQ's soil samples from outside of the facility. The MDEQ did not detect any Aroclor 1260 on the property immediately outside the

plant. Aroclor 1254 was the predominant Aroclor found in the plant. The MDEQ also did not detect any PCBs in the chip storage area where one would expect to find them if they were in the *854 cutting or quench oils. Mr. McLaughlin could not account for this discrepancy between his findings and the findings of the MDEQ. The area the samples were taken from could have included material from many places other than Eaton, including upstream sources on the Zantman Drain, or the highway. According to Mr. Barrick, in light of this negative and contradictory evidence, it would not be reasonable from a scientific standpoint to associate the PCB detections at K-1 and K-2 with the Eaton facility.¹⁵²

Mr. Barrick acknowledged that the PCBs in sample K-3 could be associated with the Eaton facility, although there is also the possibility that it could have come from another source, such as the railroad tracks. Mr. McLaughlin acknowledged that there was runoff from the railroad tracks, and that there are reports of PCB contamination associated with railroad tracks. He stated, however, that PCBs were not generally on collector lines like the one at issue, but were rather associated with maintenance facilities and electric locomotives.¹⁵³

According to Mr. Barrick, the non-detection of PCBs at K-4 is of particular significance. Even assuming K-4 was taken where the new Zantman Drain emerges from under Mosel Avenue, rather than where the old Zantman Drain used to emerge, it would have been one of the first collection points for sediment or other oil from the plant. Because this is a slow-moving, organic-rich system with a lot of vegetation, it would have absorbed many of the PCBs if they had been present. Accordingly, if PCBs had been used in the cutting oils or in the heat treat areas of the plant, the plant would have been a continuing source of PCBs, and one would expect to find them in the culvert.¹⁵⁴ The lack of PCBs at K-4 tends to indicate that PCBs were not a part of the process oils used in the open systems at the Eaton Kalamazoo facility.

Mr. Barrick testified that the PCBs found on the floor at the Kalamazoo facility related to incidental leaks from the electrical equipment. Very little contamination left the facility, and what contamination did leave was sporadic. According to him, such incidental PCBs would tend to be trapped in the marshy area north of Mosel Avenue, and would not have made it all the way down the drain to the Kalamazoo River.¹⁵⁵

KRSG did no testing for PCBs between Mosel Avenue and the River. Eaton contends that Plaintiff's failure to do so is a fatal flaw in its proofs in this two site case. The Sixth Circuit previously observed in *Benteler* that

In a two-site case such as this, where hazardous substances are released at one site and allegedly travel to a second site, in order to make out a prima facie case, the plaintiff must establish a causal connection between the defendant's release of hazardous substances and the plaintiff's response costs incurred in cleaning them up.

Benteler, 171 F.3d at 1068. This Court's entry of summary judgment in favor of Benteler was affirmed in light of evidence that the drainage ditch that allegedly connected Benteler to Morrow Lake and the Kalamazoo River was 3200 feet long; the evidence was unrefuted that no PCBs were detected beyond 1500 feet from the facility; hydrogeological evidence demonstrated that the ditch lacked sufficient water flow *855 to carry PCBs the full length of the ditch; and soil and vegetation in the ditch was not consistent even with occasional discharges of sufficient magnitude to carry water down the ditch to Morrow Lake. *Id.* at 1068-69.

The evidence with respect to the lack of flow through Zantman Drain is not as strong as the evidence with respect to the drain at issue in *Benteler*. In this case, while the drainage was slow, there did appear to be sufficient water flow to connect the Zantman Drain with the Kalamazoo River. In light of the evidence that PCBs were found on the floor at Eaton's Kalamazoo facility, that Eaton was discharging almost half a million gallons of wastewater to the Zantman Drain on a daily basis in 1965 and 1968, and that there was at least a trickle of water coming through the drain pipe from under the Upjohn Building at this time, the Court is satisfied that there was some flow from Eaton to the Kalamazoo River via the Zantman Drain.

Plaintiff's expert, Dr. Brown, undertook some sampling of the Kalamazoo River upstream and downstream of the Eaton Kalamazoo facility in an attempt to isolate the potential effect of the Zantman Drain. He testified that based upon the wide variability in the samples, both as to concentration and composition of Aroclors, he could not prove or disprove a release of PCBs from Eaton's Kalamazoo facility. The release of PCBs from Eaton would have to increase the concentration of River PCBs by almost fifty percent before they would be detectable. Even when he adjusted concentrations by dividing by the amount of organic matter, there was still too much scatter in the data to show any contribution from Eaton's Kalamazoo facility. Dr. Brown explained that because the

twenty mile segment of the River from the foot of the Morrow Dam upstream of the Kalamazoo facility, all the way down to Plainwell, has no dams or obstacles, and is fairly steep and fast-flowing, it operates as a pipe, moving the PCBs downstream to Lake Allegan. According to Dr. Brown, while it is not possible to trace the PCB detections in the River to Eaton or to any other source along the Kalamazoo River, the detections are consistent with a PCB discharge from Eaton's Kalamazoo facility. Dr. Brown opined that PCBs were released from the Kalamazoo facility in oils to the Zantman Drain and the Zantman Drain transported those to the Kalamazoo River.¹⁵⁶

Eaton's expert, Mr. Barrick, also studied the Kalamazoo River in the vicinity of the Zantman Drain. He agreed with Dr. Brown that the Kalamazoo River in the vicinity of the Zantman Drain is relatively straight. However, he indicated that just before the Zantman Drain, the River makes a loop going left and right. This meander results in slower flow and provides opportunities for material to collect. Even if the River in this vicinity is characterized as a pipe, it is a rough pipe with many pockets for material to accumulate.¹⁵⁷

Mr. Barrick studied hundreds of samples from the River collected by the MDEQ and by BBL on behalf of KRSBG. Rather than stepping back and averaging the samples for a broad view, he took a more forensic approach and focused on individual samples and specific Aroclors to determine whether the Zantman Drain was a potential source of PCBs to the River. Because he found no increase in *856 1254/1260 (the Aroclors found at the Eaton plant), that was not accompanied by a rise in other Aroclors that could not be attributed to Eaton, he concluded that there was no correlation between the Zantman Drain and the River sediments. When he focused on the samples with the highest percentage of Aroclors 1254 and 1260, he found that there were more of these samples upstream of Eaton than downstream. There was nothing atypical, unusual or remarkable downstream of the Zantman Drain that was not already apparent in the system upstream.¹⁵⁸ Based upon the data from the facility, the drain and the River, Mr. Barrick concluded that the most logical interpretation is that there was no contribution of PCBs from the Eaton Kalamazoo facility.¹⁵⁹

In determining whether Eaton's Kalamazoo facility is liable for the release of PCBs to the River the Court has considered all the evidence presented. The Court notes that there is no testimony from anyone with personal knowledge that Eaton ever used PCB-containing oils in its processes. There is no evidence of any test results showing the presence of PCBs in the cutting oils or quench oils used in the Eaton plant. There is no testimony

that Eaton engaged in activities that required PCB additives in the cutting or quench oil. PCBs were, however, found on the floors of the facility. Although Aroclor 1248 was detected in only one sample, its presence makes it more likely than not that Eaton used PCB-containing hydraulic oil at some point in time. It is also more likely than not that some of Eaton's capacitors and transformers leaked PCB-containing oil. Eaton's oils and waste discharges were reported throughout the length of the Zantman Drain, north of Mosel Avenue, as reflected in numerous complaints and reports in the historical record. Based upon all the evidence and the Sixth Circuit's direction that any release of PCBs is sufficient for a finding of liability, the Court finds it more probable than not that some of the PCBs from the floor of the Kalamazoo facility were washed down the drain and into the Kalamazoo River along with the other oily wastes from the facility. The Court accordingly concludes that Eaton's Kalamazoo facility is liable for the release of some PCBs to the Kalamazoo River.

IV. MARSHALL FACILITY

Of the three Eaton facilities at issue in this case, the Marshall facility is located farthest upstream. The Marshall facility is thirty miles upstream of the NPL Site, but is within the area to be studied under the AOC. The Marshall facility is approximately one-quarter mile from the Kalamazoo River.

Eaton has operated the Marshall facility since 1941.¹⁶⁰ Historically, the Marshall facility was engaged in the manufacture, assembly and testing of hydrostatic transmissions, viscous fan clutches, power steering pumps, differentials and lubricating oil pumps. Machining operations included lathing, grinding, boring and drilling. There were no forging operations at the plant, but some of the parts received heat treatment.¹⁶¹ In contrast to the Battle Creek and Kalamazoo facilities, the Marshall facility is still in operation.

No evidence was presented of any use of PCB-containing oils in the processes at the *857 Marshall facility. There was no testing of the process oils at the Marshall plant showing the presence of PCBs, and no Eaton employee has testified to the use of PCBs in the process oils at the Marshall plant.¹⁶²

Although some of the electrical equipment at Eaton's Marshall plant used PCB-containing oils, Plaintiffs

presented no evidence of any leaks at the Marshall facility from these closed systems. Thomas Swalwell has been employed at Eaton's Marshall facility for thirty-one years, since 1966, as an electrician and maintenance supervisor. He testified that there were trays under all of the capacitors to catch any leaks, but he was not aware of any capacitor ever leaking at the Marshall facility.¹⁶³

The wastewater from the Marshall plant was sampled and tested for PCBs by the MDNR in 1973. No detectable levels of PCBs were found.¹⁶⁴ The wastewater from the Marshall plant was sampled and tested for PCBs by the MDNR again in August 1980. Testing was done at two outfalls from the plant to the storm sewer. Cooling waters, roof and yard drainage were discharged through Outfall 001. Cooling water used in degreasers, heat exchangers and welders was discharged to Outfall 002. The MDNR reported that PCBs had been detected at Outfall 001 at the level of 0.82 ug/l (ppb). No detectable levels of PCBs were found at Outfall 002.¹⁶⁵ The MDNR suggested that the PCBs that were found "are most likely associated with the oils that are used at the plant," and recommended that Eaton test the oils at the plant for PCBs to determine the exact source and to eliminate these toxic compounds from the discharge.¹⁶⁶

Eaton immediately followed up on the MDNR's 1980 detection of PCBs at Outfall 001. A review of all incoming products disclosed none containing PCBs.¹⁶⁷ Eaton also took additional samples of wastewater at Outfalls 001 and 002, and a concentration of water soluble oil and machinery fluid, on January 9, 1981. The samples were sent to Environmental Research Group, Inc. All samples were non-detect for PCBs.¹⁶⁸

The 1980 PCB detection has never been repeated, despite additional sampling. On April 3, 1981, Thomas Newell of the MDNR recommended that PCB monitoring should no longer be required at Eaton's Marshall facility "because they do not use it." Newell stated that is was his "opinion that occasional PCB's may be in the oils used in the plant but at trace contaminant levels."¹⁶⁹ Further sampling in 1983 of pollutants in the Marshall facility wastewater was also non-detect for PCBs.¹⁷⁰ On November 21, 1985, the MDNR conducted an inspection to determine ***858** compliance with PCB regulations. The inspection revealed no leaking transformers or capacitors. Company officials reported no known use of Pydraul in their hydraulic systems. All testing of plant oils was non-detect for PCBs.¹⁷¹

Eaton's Marshall plant dumped industrial wastes in a landfill from the 1950s to the 1970s. In 1990 the USEPA conducted an inspection of the Eaton landfill in Marshall. There is no reference in the report to any PCBs.¹⁷²

In 1993, Eaton engaged an outside environmental consultant, Applied Science and Technology, Inc. ("ASTI"), to conduct sediment sampling for PCBs in the Kalamazoo River immediately downstream of the Marshall facility. The purpose of the testing was to determine whether PCBs had been discharged from the Marshall plant. Because PCBs have an affinity for fine-grained sediments if they were to settle out, the consultants tested fine-grained sediments from the three depositional zones identified. No detectable levels of PCBs were found.¹⁷³

No one on behalf of Plaintiff has tested the sediments in the vicinity of Marshall and immediately downstream of the Marshall facility. KRSG has conducted no testing of River sediments between the Marshall plant and Morrow Lake,¹⁷⁴ approximately thirty miles downstream of the Marshall plant.¹⁷⁵

The studies that have been conducted in the River between Marshall and Morrow Lake reveal no PCBs in the vicinity of the Marshall plant. In 1976 and 1988 the MDNR sampled riverbed sediments in impoundment areas downstream of the Eaton Marshall plant, where PCBs would be expected to be deposited, and found none.¹⁷⁶ In all the sampling of riverbed sediments and settleable solids for almost twenty miles downstream of Marshall, no PCBs were detected.

Plaintiff's entire case against Eaton's Marshall facility rests upon the single detection of PCBs in the MDNR's 1980 water survey. Dr. Brown testified that although non-detects are not sufficient in and of themselves to rule out the presence of PCBs at a site, a single detection of PCBs is typically good confirmation that PCBs were present.¹⁷⁷

Although one discharge may be sufficient to support a finding of liability, this Court looks for some corroborating evidence to insure that the one detection is reliable. In this case there is no corroborating evidence. Eaton went to great lengths to determine the possible source of the PCBs, and was not able to find any. Despite repeated efforts, Eaton has never been able to replicate the MDNR's finding.

Thomas Newell, MDNR District Engineer, testified that it was his opinion that the Marshall plant's PCB detection was due to PCB containing process oils commonly used in the auto parts manufacturing industry. His opinion amounts to no more than speculation. He had no personal knowledge of the oils Eaton actually used at the plant. In fact, his opinion was based in part on his assumption that Eaton ***859** had a die-casting operation.¹⁷⁸ This

assumption was inaccurate, as Eaton did not conduct die-casting at its Marshall facility.¹⁷⁹

The KRSG has done nothing to verify the reliability of the one PCB detection. Dr. Brown has no specific knowledge of the application of PCBs in cutting oils at the Marshall plant.¹⁸⁰ Despite the fact that the Eaton Marshall facility is still in operation, and despite the fact that Eaton's historic wastes are known to be present at the Eaton landfill in Marshall, no showing has been made that KRSG made any effort to collect evidence from these obvious sources of historic information.

Based upon all the evidence presented, the Court finds that the single admittedly low level detection of PCBs at the Marshall facility in 1980 is not reliable. There being no other evidence of PCBs discharged by the Marshall facility, the Court concludes that Plaintiff has not met its burden of demonstrating by a preponderance of the evidence that Eaton released PCBs from its Marshall facility to the Kalamazoo River. Accordingly, the Court finds that Eaton is not liable for the release of any PCBs from its Marshall facility.

V. CONCLUSION

In summary, the Court finds that Eaton is liable for the release of PCBs in some quantity, small though it may

have been, from its Battle Creek and Kalamazoo facilities, but that Eaton is not liable for the release of PCBs from its Marshall facility.

An order and partial judgment as to liability consistent with this opinion will be entered.

ORDER AND PARTIAL JUDGMENT

In accordance with the opinion entered this date,

IT IS HEREBY ORDERED that **JUDGMENT AS TO LIABILITY ONLY** is entered in favor of Plaintiff Kalamazoo River Study Group and against Defendant Eaton Corporation with respect to Eaton Corporation's Battle Creek and Kalamazoo facilities.

IT IS FURTHER ORDERED that **JUDGMENT** is entered in favor of Defendant Eaton Corporation with respect to its Marshall facility.

All Citations

142 F.Supp.2d 831, 52 ERC 1842, 31 Env'tl. L. Rep. 20,617

Footnotes

¹ 6/30/98 Opinion and Order (Docket # 756 & 757), and 12/7/98 Opinion and Order and Partial Judgment (Docket # 849 & 850).

² On 1/17/01, pursuant to a stipulation between KRSG and Menasha, this Court entered an order dismissing without prejudice KRSG's claims against Menasha, and Menasha's claims against KRSG. (Docket # 969). Accordingly, the only Defendant left in the liability action was Defendant Eaton.

³ Citations to the trial transcript from the 1/17–19/01, bench trial will be referred to as Tr. at _____. Citations to testimony from previous bench trials will include the date of the bench trial.

⁴ Although not a party to the AOC, James River joined the KRSG and has agreed to participate in the conducting and

funding of the RI/FS.

⁵ 12/7/98 opinion (Docket # 849); 6/3/00 opinion (Docket # 942).

⁶ Uncontroverted Facts, ¶ 19, Final Pretrial Order (Docket # 826), Attachment C.

⁷ Uncontroverted Facts at ¶ 26; Steven F. Fesko dep. at 40; Kenneth Manchen dep. at 95.

⁸ Uncontroverted Facts ¶ 19.

⁹ Stuart Lightfoot dep. at 13.

¹⁰ Carleton Swanson dep. at 10.

¹¹ Uncontroverted Facts at ¶ 21; Lightfoot dep. at 11–13; Bill Romick dep. at 9.

¹² Clifford Galen dep. at 22, 30, 90–92.

¹³ Galen dep. at 22.

¹⁴ Roosevelt Jones dep. at 107–08; James Seaver dep. at 54–56; Lightfoot dep. at 24–25.

¹⁵ Jones dep. at 108.

¹⁶ John Eustis dep. at 55–56.

¹⁷ Galen dep. at 85.

¹⁸ Chuck Heindrichs dep. at 16–19.

¹⁹ Heindrichs dep. at 57–59.

²⁰ Romick dep. at 12–13.

²¹ Galen dep. at 69–70.

²² Galen dep. at 20, 90–93.

²³ Swanson dep. at 57–58; Galen dep. at 122–24.

²⁴ John Bloemer dep. at 16–18; Seaver dep. at 190–93; Lightfoot dep. at 133–34.

²⁵ Galen dep. at 48.

²⁶ Exh.2019, Environmental Pollution Survey; Swanson, dep. at 19; Lightfoot dep. at 50; Galen dep. at 16.

²⁷ Exh.2019.

²⁸ Swanson dep. at 22–23.

²⁹ Uncontroverted Facts at ¶ 22.

³⁰ Galen dep. at 16.

³¹ Exh.2018, 4/10/70 letter from Eaton to MDNR, referencing 1967 survey.

³² Exh.2011, 1/12/68 letter from Eaton to MDNR; Exh.2013, 5/10/68 Internal Eaton Memo; Exh.2014 8/22/68 letter

from MWRC to Eaton; Exh.2015, 12/23/68 letter from MWRC to Eaton; Galen dep. at 50.

33 Galen dep. at 49–55.

34 Galen dep. at 49.

35 Exh.2018, 4/10/70 letter from Eaton to MDNR.

36 Exh.2022, 6/11/70 internal Eaton memorandum re Environmental Pollution Survey.

37 Exh.2018.

38 Exh.2029, 7/17/73 MWRC Facilities Inspection Report.

39 Exh.2081, Snell Environmental Group, Phase I Investigations Report; Manchen dep. at 79–86.

40 Fesko dep. at 41–42.

41 *See, e.g.*, Romick dep. at 6–7, 17–19; Jones dep. at 187; Ted Wolf dep. at 46.

42 Exh.2067/6007, 1979 Pollution Incident Prevention Plan; Jones dep. at 59, 163–64; Romick dep. at 17, 28, 37–41.

43 Wharton testimony, Tr. at 395 (550 pounds of Pydraul per 55–gallon drum).

44 Stipulation entered 1/9/01, Docket # 964; Tr. at 4.

45 Exh.2027, Industrial Effluents at 2; Uncontroverted Facts at ¶ 23.

46 Exh.2028, MWRC 9/25–27/72 Wastewater Survey; Uncontroverted Facts at ¶ 23.

47 Exh.2028, Wastewater Survey at 7.

48 Plaintiff’s expert, Dr. Crumrine, admitted that he had testified in another case that testing at a detection limit of less than 1 ppb, even in 1983, was below the concentration level where wastewater characterization could be reliably determined using state of the art monitoring procedures. Crumrine testimony Tr. 8/12/98 at 144–47.

49 Exh.2028.

50 Tom Matson testimony, Tr. at 39–49; Exh.2085NNN.

51 Matson testimony, Tr. at 39–49, 57–58; Exh.2085JJJ (Eaton line shown in yellow, Clark line shown in red).

52 Matson testimony, Tr. at 44–45; Exh.2085NNN.

53 Exh. 6011, 1/26/81 letter from Eaton to MDNR Water Quality Division.

54 Exh. 6012, 4/3/81 internal MDNR Water Quality Division memo from Newell.

55 Manchen dep. at 56–67.

56 Exh.2067, Howard Laboratories Inc. Report of PCB Analyses re Eaton–Battle Creek, 10/5/83, and Additional Analyses of Floor Blocks, 10/12/83; Howard dep. at 56.

57 Exh. 1372, Aroclors, The Physical Properties and Suggested Applications, at 15–17; Exh.2023, Monsanto PCB Products.

58 Crumrine testimony, Tr. 8/12/98, at 98.

- 59 Exh.2023; Exh. 1372; Crumrine testimony, Tr. 8/12/98 at 100–101; Wharton testimony, Tr. at 399.
- 60 Crumrine testimony, Tr. 8/12/98 at 58–59; McLaughlin testimony, Tr. at 254.
- 61 Manchen dep. at 61–66.
- 62 Lightfoot dep. at 154.
- 63 Manchen dep. at 73.
- 64 Exh.2059, Versar Inc. 5/14/81 report on inspection of Eaton Corporation to determine compliance with PCB disposal and marking regulations, performed for U.S. EPA.
- 65 Heindrichs dep. at 277–79.
- 66 Exh.2072, Anspec Technical Services, Inc., 9/6/84 letter and data summary sheet.
- 67 McLaughlin testimony, Tr. at 293–96, 307–16; Exh.2085JJ, map showing sample locations.
- 68 McLaughlin testimony, Tr. 1/18/01 at 296–97, 316–17.
- 69 McLaughlin testimony, Tr. at 312–15.
- 70 Connolly testimony, Tr. at 467–68.
- 71 Brown testimony, Tr. at 178.
- 72 Brown testimony, Tr. 8/10/98 at 80–81.

- ⁷³ Exh.2036/6110, John Wuycheck 4/13/77 Sediment and Settleable Solids Samples—Kalamazoo River, 1976.
- ⁷⁴ Brown testimony, Tr. 8/10/98, at 75–77.
- ⁷⁵ Exh. 6020, 7/7/88 MDNR Qualitative Biological Survey of Kalamazoo River.
- ⁷⁶ Connolly testimony, Tr. 8/14/98, at 37–39.
- ⁷⁷ Connolly testimony, Tr. at 449–53.
- ⁷⁸ Connolly testimony, Tr. at 454–55.
- ⁷⁹ Connolly testimony, Tr. at 455–57.
- ⁸⁰ Wharton testimony, Tr. at 400.
- ⁸¹ Wharton testimony, Tr. at 383–85.
- ⁸² David Howard dep. at 6, 17–21, 23, 32.
- ⁸³ Exh. 2212, 1985 GZA Environmental Site Assessment; Exh. 6114, 1976 MDNR Industrial Wastewater Survey; Exh. 2232, 1978 MDNR Discharge Permit Application.
- ⁸⁴ Exh. 2215, 1967 MWRC Industrial Survey.
- ⁸⁵ Brown testimony, Tr. at 179.
- ⁸⁶ Martin dep., vol. 1, at 14, 21–22, 46, 50, 54–55; Martin dep., vol. 2, at 28–29; Exh. 2233, 1968 MWRC Industrial Wastewater Survey.

⁸⁷ Martin dep., vol. 1 at 16–29; Martin dep., vol. 2 at 137; Exh. 2233, 1968 MWRC Industrial Wastewater Survey.

⁸⁸ Baker dep. at 36–40; Duane Clarke dep. at 47.

⁸⁹ Clarke dep. at 19–21; David Stephayn dep. at 34–35, 39.

⁹⁰ Clarke dep. at 21–22; Martin dep., vol. 2, at 62.

⁹¹ Martin dep., vol. 2, at 62–64.

⁹² Clarke dep. at 17–20.

⁹³ Martin dep., vol. 1, at 50–51.

⁹⁴ Baker dep. at 14, 38–40.

⁹⁵ Clarke dep. at 17–18, 45–46.

⁹⁶ Clarke dep. at 51–52.

⁹⁷ Martin dep., vol. 2, at 128–29.

⁹⁸ Exh. 2233, 1968 MWRC Industrial Wastewater Survey.

⁹⁹ Martin dep., vol. 1 at 25; Clarke dep. at 30–31.

¹⁰⁰ Exh. 2215, 1967 MWRC Industrial Survey.

- ¹⁰¹ Clarke dep. at 30.
- ¹⁰² Martin dep., vol. 1 at 22.
- ¹⁰³ Exh. 2213, MWRC March 1965 Report of Survey. *See also* 11/14/67 letter from MUCC to MWRC complaining about Eaton's discharge of oils to the Zantman Drain, and expressing concern that if plans to improve the drain are carried out, the oils will flow directly into the Kalamazoo River.
- ¹⁰⁴ Exh. 6302, 5/14/65 letter from Eaton to County Drain Commissioner, quoting from MWRC's 3/23/65 survey.
- ¹⁰⁵ Exh. 6302, 5/14/65 letter from Eaton to County Drain Commissioner.
- ¹⁰⁶ Exh. 2215, MWRC June 1967 Industrial Survey.
- ¹⁰⁷ Exh. 2216, 10/23/67 letter from Eaton to MDNR; Exh. 2217, 1/29/68 letter from Eaton to MDNR.
- ¹⁰⁸ Exh. 2216, 10/23/67 letter from Eaton to MDNR; Martin dep., vol. 2 at 31.
- ¹⁰⁹ Martin dep., vol. 1 at 56–57; Martin dep., vol. 2 at 26, 158; Baker dep. at 19.
- ¹¹⁰ Clarke dep. at 29–30.
- ¹¹¹ Exh. 2220, Briefing Memo for NPDES Application.
- ¹¹² Exh. 2219, MWRC 1973 Industrial Wastewater Survey; Exh. 6113, 1976 MDNR Industrial Wastewater Survey.
- ¹¹³ Exh. 2232, 1978 MDNR Discharge Permit Application.

- ¹¹⁴ Stephayn dep. at 97–98.
- ¹¹⁵ Robert Snell testimony, Tr. at 71, 83; Exh. 2230, 1966 diagram of Zantman Drain; Exh. 2200A, 1955 Aerial Photograph; Exh. 2201, 6/8/64 letter from Snell to Kalamazoo Township Board; Exh.2085KKK, aerial photo and overlay.
- ¹¹⁶ Snell testimony, Tr. at 81–82.
- ¹¹⁷ Snell testimony, Tr. at 84, 89–90; Exh. 2201, 6/8/64 letter from Robert E. Snell to the Kalamazoo Township Board; Exh. 6300, 5/4/64 letter from Eaton to County Drain Commissioner; Exh. 2253, 10/21/65 letter from Eaton to County Drain Commissioner.
- ¹¹⁸ Snell testimony, Tr. at 92–103; Exh.2085M, map of Zantman Drain; Exh. 2200–D, 1974 Aerial Photograph; Exh. 2200–E, 1991 Aerial Photograph.
- ¹¹⁹ Exh. 2213, MWRC 1965 Report of Survey.
- ¹²⁰ Exh. 2233, MWRC 1968 Industrial Wastewater Survey.
- ¹²¹ Brown testimony, Tr. at 211–12.
- ¹²² Snell testimony, Tr. at 89–90.
- ¹²³ Exh. 2206, MWRC 3/29/74 NPDES Permit.
- ¹²⁴ Exh. 2226, 12/19/73 letter from Kalamazoo County Drain Commissioner to Eaton.
- ¹²⁵ Exh. 2202, 12/16/74 letter from Wilkins & Wheaton Engineering Co. to Kalamazoo County Drain Commission; Exh. 2203, 12/8/75 letter from Wilkins & Wheaton Engineering Co. to Kalamazoo County Drain Commission.
- ¹²⁶ Brown testimony, Tr. at 179.

- ¹²⁷ Clarke dep. at 4, 10, 13, 46, 57, 63–65.
- ¹²⁸ Exh. 6113, 1973 MWRC Industrial Wastewater Survey.
- ¹²⁹ Exh. 6114, MDNR 1976 Industrial Wastewater Survey.
- ¹³⁰ Exh. 2209, Eaton Floor PCB Analyses.
- ¹³¹ Lightfoot dep. at 5, 172–73.
- ¹³² Lightfoot dep. at 175.
- ¹³³ Exh. 2212, GZA Environmental Site Assessment.
- ¹³⁴ Exh. 6305, Eaton’s demonstrative exhibit depicting results of 1984 and 2000 PCB testing; Exh.2085MM, Plaintiff’s demonstrative exhibit depicting results of 1984 and 2000 PCB testing; Barrick testimony, Tr. at 489.
- ¹³⁵ Barrick testimony, Tr. at 489, 492–93; Wharton testimony, Tr. at 391.
- ¹³⁶ Exh. 6145, 1/10/72 letter from MWRC to Eaton, approving Eaton’s plan to line settling basin with paper mill sludge; Barrick testimony, Tr. at 492–93.
- ¹³⁷ Brown testimony, Tr. at 202.
- ¹³⁸ McLaughlin testimony, Tr. at 269, 275–76; Exh.2085MM.
- ¹³⁹ Barrick testimony, Tr. at 493; Exh.2023, Monsanto PCB Products at 3–4; Exh. 1372, Aroclors, The Physical Properties and Suggested Applications, at 9.

¹⁴⁰ Brown testimony, Tr. at 184, 202; Exh. 2216, 10/23/67 letter from Eaton to MDNR, documenting use of detergents.

¹⁴¹ McLaughlin testimony, Tr. at 331–34.

¹⁴² Brown testimony, Tr. at 143; Wharton testimony, Tr. at 370–88; Barrick testimony, Tr. at 486.

¹⁴³ Wharton testimony, Tr. at 370–88; Barrick testimony, Tr. at 486.

¹⁴⁴ Wharton testimony, Tr. at 363–64; Barrick testimony, Tr. at 486–87.

¹⁴⁵ Wharton testimony, Tr. at 390; Exh. 6305; Exh.2085MM.

¹⁴⁶ Wharton testimony, Tr. at 391–94, 403; Exh. 6305.

¹⁴⁷ Wharton testimony, Tr. at 366–69, 383–84.

¹⁴⁸ Wharton testimony, Tr. at 385–86.

¹⁴⁹ McLaughlin testimony, Tr. at 248–250; Exh.2085P, Analytical Report prepared for SCS Engineers; Exh.2085KKK.

¹⁵⁰ McLaughlin testimony, Tr. at 250–53; Exh.2085KKK.

¹⁵¹ McLaughlin, testimony, Tr. at 254–56.

¹⁵² Barrick testimony, Tr. at 501–03.

¹⁵³ McLaughlin testimony, Tr. at 252–53.

154 Barrick testimony, Tr. at 505–08.

155 Barrick testimony, Tr. at 488–89.

156 Brown testimony, Tr. at 150–59; Exh.2086A, Map of Kalamazoo River in Vicinity of Eaton Corporation’s Kalamazoo Facility.

157 Barrick testimony, Tr. at 511–12, 527–28; Exh. 6306, Facility Location.

158 Barrick testimony, Tr. at 513–21; Exh. 6307, Proportions of Aroclor 1254 and 1260 in total PCBs from confluence to KPT–39.

159 Barrick testimony, Tr. at 529.

160 Fesko dep. at 39–40; Olof Stolen dep. at 188–89.

161 Stolen dep. at 10, 17–18, 45–46.

162 Brown testimony, Tr. at 171.

163 Thomas Swalwell dep. at 4–6, 112–13.

164 Exh. 6105, 8/6/73, letter from MDNR with Report of 6/12/73–6/14/73 Industrial Wastewater Survey.

165 Exh. 6101, MDNR letter of 12/18/80 with Report of Industrial Wastewater Survey.

166 Exh. 6101, 12/18/80 letter at 2.

167 Exh. 6103, Rex Simmons, Mng. Plant Engineering 1/26/81 letter to MDNR.

¹⁶⁸ Exh. 6102, ERG Amended Laboratory Analysis report dated 1/26/81.

¹⁶⁹ Exh. 6104, Newell Memorandum of 4/3/81.

¹⁷⁰ Exh. 6101, MDNR letter of 1/17/84, with Report of 5/983–5/10/83 Industrial Wastewater Survey; Exh. 6107, 3/20/84 letter from Eaton to MDNR, with 1/30/84 lab results of 12/23/83 samples.

¹⁷¹ Exh. 6108, MDNR 11/21/85 Report on PCB Inspection, at 4.

¹⁷² Exh. 6109, MDNR 8/1/90 Screening Site Inspection Report for Eaton Landfill.

¹⁷³ Exh. 6111, ASTI 5/14/93, Sediment Sampling; Brown testimony, Tr. at 177–78.

¹⁷⁴ Connolly testimony, Tr. at 481.

¹⁷⁵ Brown testimony, Tr. at 178.

¹⁷⁶ Exh. 2036/6110, Wuycheck Study; Exh. 6020, 1988 study.

¹⁷⁷ Brown testimony, Tr. at 166.

¹⁷⁸ Newell dep. at 45.

¹⁷⁹ Brown testimony, Tr. at 169.

¹⁸⁰ Brown testimony, Tr. at 170.

