SUPERIOR COURT OF THE STATE OF WASHINGTON
IN AND FOR KING COUNTY

ANGELA M. BARD and WILLIAM BARD, individually and as legal guardians of minor J.D.B.; JESSICA L. BARD; JOHN M. BEUTLER; STACY R. MULLEN-DELAND and ERIC DELAND, individually and as legal guardians of minors A.S.M.D. and C.R.M.D.; DONYA C. GRANT and WELDON J. GRANT, individually and as legal guardians of minors H.B.G., K.M.G., M.A.G. and R.K.G; CEANNA N. HEIT; MELANIE K. LONG, individually and as legal guardian of minors A.D.L., A.R.L. and I.R.L.; ILYANA A. LONG; HOLLY A. MILLS; CHERYL T. PRITCHETT and JOEL PRITCHETT, individually and as legal guardians of minors I.G.P. and M.E.P.; JILL E. SAVERY and JAMES SAVERY, individually and as legal guardians of minors M.E.S. and S.L.S.; ARICA L. SMITH-SIMMER, individually and as legal guardian of minors K.R.M.S. and N.D.S.; ILLYEANNA WOLFSTORM, individually and as legal guardian of minor I.S.W.; JAMES L. WOODARD; and DOES 1-250;

Plaintiffs,

v.

MONSANTO COMPANY, a Delaware corporation; SOLUTIA, INC., a Delaware corporation; PHARMACIA LLC, a Delaware limited liability corporation, f/k/a Pharmacia Corporation; STATE OF WASHINGTON; MONROE SCHOOL DISTRICT NO. 103 d/b/a MONROE PUBLIC SCHOOLS; UNION HIGH SCHOOL DISTRICT NO. 402; SNOHOMISH HEALTH DISTRICT; and ROES 1-10;

Defendants.

No.

COMPLAINT FOR DAMAGES

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I. INTRODUCTION TO THE SKY VALLEY EDUCATION CENTER CASE

Monsanto intentionally produced and promoted in the U.S. more than 1.25 billion pounds of synthetic chemicals called Polychlorinated Biphenyls (PCBs). According to U.S. government agencies, PCBs are "extremely toxic" and damage essentially every system of the human body. Since the 1930s, Monsanto has known that PCBs are toxic, yet promoted them without adequate warnings for electrical, construction, and other applications—until they were banned. Internal memoranda, however, show that while Monsanto knew PCBs are toxic, Monsanto made decisions based on PCB profits. As a consequence, PCBs were produced and incorporated into public buildings, including school buildings. Today up to 14 million school children in roughly 20,000 U.S. school buildings may be exposed to PCBs, as estimated by a Harvard School of Public Health study. Monsanto still fails to adequately warn about the extreme toxicity of its PCBs.

In this case, the contaminated school buildings are called Sky Valley Education Center. They contained PCBs and other toxic chemicals, exposing the children and adults who used the buildings. As a result, these individuals have been coping with adverse medical effects, including neurological damage, autoimmune and endocrine diseases, and cancers. The State, the School District, and the Health District negligently allowed the toxic chemicals to exist in the buildings, due in part to Monsanto's ongoing failure to warn about PCBs' extreme toxicity. Regardless, the public entities had joint duties of reasonable care to provide, maintain, inspect, operate, and supervise public education for the children and adults at Sky Valley. The public entities violated their duties by allowing the toxic chemicals to remain in the school buildings and poison these children and adults.

This case is about school safety and the toxic chemicals in school buildings that poisoned children and adults, and whether under state law the manufacturer will be held accountable for its toxic products, and whether the public entities that are obligated to provide safe school buildings will be held accountable for the toxic school buildings.

The following EPA slide demonstrates the mechanism of the toxic poisoning:

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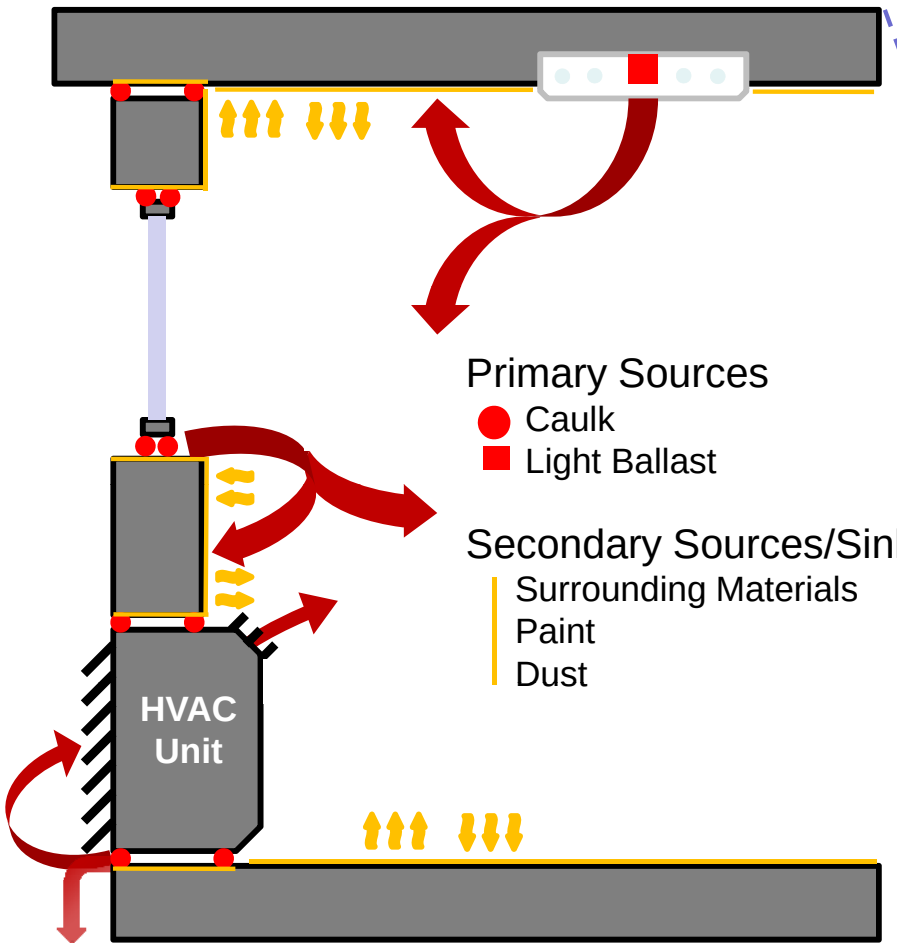
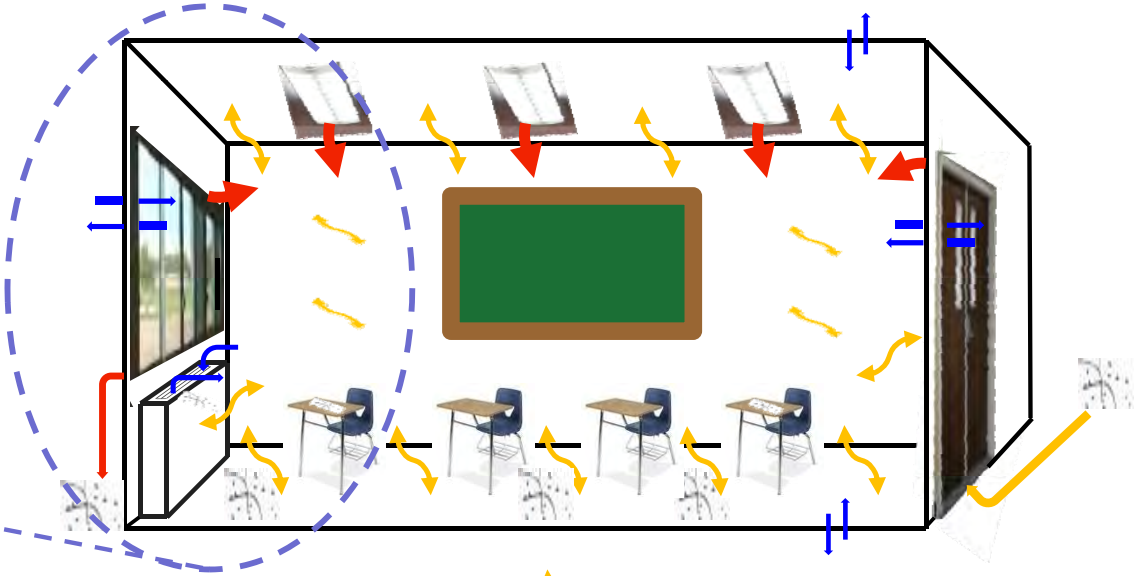
PCBs - A Complex Problem in Buildings

United States Environmental Protection Agency

Example Scenario



- Over 100 PCB chemicals
- Multiple primary sources possible
- Transport from sources to air, surfaces, dust, soil
- Secondary sources created
- Exposures through multiple pathways
- Ventilation and temperature effects



Ventilation | Primary PCB Source | Secondary PCB Sources and Sinks | Dust/Soil

II. IDENTITY OF THE PARTIES

A. Identities of the Defendants.

1. In 2015 and 2016, the Cities of Spokane and Seattle and the State of Washington each separately sued the Monsanto Defendants for their role in contaminating Washington public resources with Monsanto's PCBs. Many of the following allegations have been made or admitted to by the State and Monsanto Company, Solutia, Inc., and Pharmacia LCC, through the State's Complaint for Damages, and Monsanto, et al.'s Answer to the Complaint, or are sourced from other public documents. *See* State's Complaint for Damages, *State v. Monsanto, et al.*, King County Case No. 16-2-29591-6-SEA (December 16, 2016), and Defendant Monsanto Company et al.'s Answer to Complaint, *State v. Monsanto Company, et al.*, No. 2:17-cv-00053 (W.D. Wash. Jan. 12, 2017); *see also City of Seattle v. Monsanto Co.*, 237 F. Supp. 3d 1096, 1100, fn 2 (W.D. Wash. 2017) ("The original Monsanto Company operated within three main industries: agricultural products, chemical products, and pharmaceuticals. In the late 1990s, Monsanto Company spun off into three separate corporations, each responsible for a different industry: Monsanto Company retained the agricultural products business; Solutia, Inc. assumed the chemical products business; and Pharmacia Corporation assumed the pharmaceutical business. Each assumed certain assets and liabilities from the original Monsanto Company, and all are defendants in this case"); *City of Spokane v. Monsanto Co.*, Case No. 2:15-cv-00201-SMJ (E.D. Wash. July 31, 2015); *see also Solutia, Inc. v. McWane, Inc.*, 726 F.Supp.2d 1316, 1318-19 (N.D. Ala. 2010) ("Monsanto Company and its predecessors produced polychlorinated biphenyls ('PCBs')… In 1997, Monsanto created Solutia in a spin-off transaction… In 2000, Pharmacia was formed by the merger of Monsanto and Pharmacia & Upjohn").

2. Defendant Monsanto Company is a Delaware corporation with its principal place of business in St. Louis County, Missouri.

3. Defendant Solutia, Inc. is a Delaware corporation with its principal place of business in St. Louis County, Missouri.

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4. Defendant Pharmacia LLC is formerly known as Pharmacia Corporation and is successor to the original Monsanto Company. Pharmacia is a Delaware limited liability corporation and is a citizen of the states of New York and Delaware. Pharmacia is now a wholly-owned subsidiary of Pfizer, Inc.

5. The original Monsanto Company ("Old Monsanto") operated agricultural, chemical, and pharmaceutical businesses.

6. Old Monsanto began manufacturing PCBs around the 1930s and continued to manufacture commercial PCBs, including PCBs used in electrical equipment applications such as light ballasts, through the 1940s, 1950s, 1960s, and 1970s, until approximately 1977.

7. Around 1997, Old Monsanto spun-off its chemical business to Solutia. Since 2000, the present or current Monsanto Company has operated the agricultural business, while Pharmacia retained the pharmaceutical business.

8. Old Monsanto is now known as Pharmacia LLC.

9. Old Monsanto organized Solutia to own and operate its chemical manufacturing business. Solutia assumed the operations, assets, and liabilities of Old Monsanto's chemical business.

10. Although Solutia assumed and agreed to indemnify Pharmacia (then known as Monsanto Company) for certain liabilities related to the chemicals business, Monsanto, Solutia, and Pharmacia have also entered into agreements to share or apportion liabilities, and/or to indemnify one or more entities, for claims arising from Old Monsanto's chemical business, including the manufacture and sale of PCBs.

11. According to Monsanto, Solutia, and Pharmacia, the three entities have entered into complex corporate transactions and agreements that determine their respective legal or financial obligations for claims arising from Old Monsanto's manufacture and sale of PCBs.

12. In 2003, Solutia filed a voluntary petition for reorganization under Chapter 11 of the U.S. Bankruptcy Code. Solutia's reorganization was completed in 2008. In

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connection with Solutia's Plan of Reorganization, Solutia, Pharmacia, and new Monsanto entered into several agreements under which Monsanto continues to manage and assume financial responsibility for certain tort litigation and environmental remediation related to the chemicals business.

13. Monsanto represented in a recent Form 10-K (for the fiscal year ending August 31, 2016): "Monsanto is involved in environmental remediation and legal proceedings to which Monsanto is party in its own name and proceedings to which its former parent, Pharmacia LLC ('Pharmacia') or its former subsidiary, Solutia, Inc. ('Solutia') is a party but that Monsanto manages and for which Monsanto is responsible pursuant to certain indemnification agreements. In addition, Monsanto has liabilities established for various product claims. With respect to certain of these proceedings, Monsanto has established a reserve for the estimated liabilities." The document specifies that the company holds $545,000,000.00 in that reserve.

14. For the Monsanto Defendants' wrongdoing that lead to PCB contamination and toxic poisonings at the school buildings in this case, Monsanto, Solutia, and Pharmacia are liable to the Plaintiffs under state tort law. These Defendants may be obligated to one another in contract for PCB tort liabilities as set out in their complex corporate agreements, but that is not the subject of this lawsuit. For purposes of this Complaint, these Defendants are referred to as "Monsanto."

15. Monsanto's conduct is a legal cause of damages to the Plaintiffs because the Sky Valley Education Center school buildings never would have become contaminated with "extremely toxic" PCBs if Monsanto had not intentionally produced and promoted PCBs in building construction applications.

16. The State of Washington is a sovereign that has constitutional and statutory duties to citizens of the State of Washington, including the Plaintiffs, through State departments, agencies, and employees at the Department of Health, the Office of the Superintendent of Public Instruction, and other offices. *See, e.g.,* Wash. State Depart. of Health, Office of Environmental Health and Safety. June 2005, p. 8, available at

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https://www.doh.wa.gov/CommunityandEnvironment/Schools/EnvironmentalHealth (last visited November 15, 2017).

17. The Department of Health is the state agency that supervises and partners with health districts, such as the Snohomish Health District, and school districts, such as Monroe School District and Union High, regarding public health safety requirements in school buildings, including the school buildings in this case. *Id.*

18. The Office of the Superintendent of Public Instruction is the state agency that supervises the public education system, which includes administrative and support responsibilities, for school districts such as Monroe School District and Union High. *Id.*

19. The Office of Superintendent of Public Instruction also partners with the Department of Health and other agencies to support student health and safety in relation to indoor air quality, including the air quality in the school buildings in this case. *Id.*

20. Monroe School District No. 103, d/b/a Monroe Public Schools, is a Washington school district.

21. Monroe School District provides educational services to families who live in King and Snohomish Counties.

22. Union High School District No. 402 is a Washington school district.

23. According to tax accessor records, Union High appears to be the owner of the land and school buildings formerly known as Monroe High School (1950-1977), Monroe Junior High (1977-1987), Monroe Middle School (1987-2011), and now known as the Sky Valley Education Center (2011-present), located at 351 Short Columbia Street at Hill and Kelsey Streets, in Monroe. In this Complaint, this location may be referred to as Sky Valley Education Center, Sky Valley, or the school buildings.

24. The Snohomish Health District ("Health District") is a Washington independent special purpose district.

25. The Health District is the municipal corporation responsible for public health in Snohomish County, in part by inspecting and enforcing minimal environmental safety requirements in educational facilities, including the school buildings in this case.

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B. Identities of the Plaintiffs.

1. The Plaintiffs are residents of King and Snohomish Counties.

2. The Plaintiffs identified in the caption by their initials are minor children who were or are students served by the Monroe School District. These Plaintiffs spent time in the school buildings. Due to the Defendants' wrongful conduct, the Plaintiffs were exposed to toxic chemicals and have suffered adverse medical consequences.

3. The Plaintiffs identified in the caption by their full names are adults who spent time in the school buildings. Due to the Defendants wrongful conduct, these Plaintiffs were exposed to toxic chemicals and have suffered adverse medical consequences.

4. The Plaintiffs identified in the caption as Does 1-250 are individuals who spent time in the school buildings. These Plaintiffs may have been exposed to toxic chemicals and suffered adverse medical consequences, as discovery may reveal. In 2016, environmental testing publicly revealed the toxic contamination in the school buildings.

5. In all, the Plaintiffs are children, parents, spouses, and Monroe School District staff members, including teachers, who were harmed due to the corporate and governmental wrongdoing of the Defendants. The Plaintiffs bring claims against the Defendants for products liability and negligence. The Plaintiffs bring claims for personal injuries as well as societal and consortium injuries to their family members.

6. The Plaintiffs will move to appoint the required guardians *ad litem* to represent and review the litigation and settlement interests of the minor children.

III. VENUE AND JURISDICTION

A. Venue is proper in King County.

1. King County venue is proper because one or more of the Monsanto Defendants transacts business in King County, including Monsanto, Solutia, and/or Pharmacia. RCW 4.12.025(1).

2. King County venue is proper because suit is against the State, and the Plaintiffs are residents of King and Snohomish Counties. RCW 4.92.010 ("Any person or

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corporation having any claim against the state of Washington shall have a right of action against the state in the superior court. The venue for such action shall be as follows: (1) The county of the residence or principal place of business of one or more of the plaintiffs").

3. King County venue is also proper because the Monroe School District transacts business in King County. RCW 4.12.025(1). A school district is a "municipal corporation." RCW 39.69.010. Venue is proper "in any county in which the defendant resides… the residence of a corporation defendant shall be deemed to be in any county where the corporation: (a) Transacts business [or] (c) transacted business at the time the cause of action arose." RCW 4.12.025(1). Although the School District has offices and buildings in Snohomish County, it transacts business in King County as well as Snohomish County by providing educational services to children and families within King County, including the Plaintiffs, who are King County residents. The School District provides educational and outreach services in King County, while also receiving compensation from King County residents for providing these services.

4. King County venue is also proper to the extent any Defendant alleges legal fault to a third-party corporate resident of King County. Such corporation may be cross-claimed against or added in an amended complaint by Plaintiffs.

5. King County venue is also proper to the extent any Defendant alleges legal fault to third-party Snohomish County and if the County becomes a party.

B. King County Superior Court has jurisdiction.

1. This Court has jurisdiction over this case. Wash. Const. Art. 4, §6; RCW 2.08.010; RCW 4.12.020(3).

IV. COMPLIANCE WITH STATUTORY NOTICE REQUIREMENTS

A. Plaintiffs complied with the statutory claim notice requirements and waiting periods for the following public entity Defendants:

1. The State of Washington;

2. Monroe School District No. 103, a/k/a Monroe Public Schools;

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3. Union High School No. 402; and

4. Snohomish Health District.

B. Plaintiffs are not required to give any statutory claim notice to the following non-public entity Defendants:

1. Monsanto Company;

2. Solutia, Inc.; or

3. Pharmacia LLC, f/k/a Pharmacia Corporation.

V. FACTS REGARDING CONTAMINATION, EXPOSURE, AND POISONING

A. Monsanto produced and promoted PCBs from the 1930s to the 1970s.

1. Polychlorinated biphenyls, or "PCBs," are mixtures of synthetic organic chemicals comprised of chlorine atoms attached to a double carbon-hydrogen ring (a "biphenyl" ring). U.S. EPA. PCBS: CANCER DOSE-RESPONSE ASSESSMENT AND APPLICATION TO ENVIRONMENTAL MIXTURES (1996) at 1. U.S. Environmental Protection Agency, Office of Research and Development, National Center for Environmental Assessment, Washington Office, Washington, DC, EPA/600/P-96/001F, 1996, available at https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=12486 (last accessed November 6, 2017). "Different mixtures can take on forms ranging from oily liquids to waxy solids." *Id.*

2. PCBs are comprised of many similar semi-volatile chemicals called congeners. A "PCB congener" is any single, unique chemical compound in the PCB category. Two hundred nine congeners have been identified.

3. From approximately the 1930s to 1977, Monsanto was the only manufacturer in the United States that intentionally produced and promoted PCBs for commercial use. *Environmental Defense Fund v. Environmental Protection Agency*, 636 F.2d 1267, 1281 fn 37 (1980) ("From the sparse legislative history of § 6(e), it also appears that Congress focused its attention on the deliberate use, manufacture, and distribution of PCBs. Throughout the congressional debate, members of Congress referred to Monsanto Company as the sole producer of PCBs. *See* 122 Cong.Rec. 8294

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(1976), reprinted in Legislative History, *supra* note 7, at 240 (Senator Tunney, speaking in support of the section, referred to Monsanto as the "sole domestic manufacturer of PCB's"); *id*. at 27187, reprinted in Legislative History, *supra* note 7, at 588 (Congressman Leggett, speaking in support of the corresponding section in the House bill, referred to Monsanto as "the only American manufacturer of PCB's").). *See also* 116 Cong. Record 11,695, 91st Congress, (April 14, 1970) ("Insofar as the Monsanto Co., the sole manufacturer of PCB's is concerned....") and 121 Cong. Record 33879, 94th Congress, (October 23, 1975) ("The sole U.S. producer, Monsanto Co....."); *and see* Sky Valley Complaint, **Exhibit A** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-1 (E.D. Wash. July 31, 2015), Bates Nos. MONS 058730-058752, entitled "PCB Presentation to Corporate Development Committee") at MONS 058733 (identifying other producers as "all ex-USA").

4. The most common trade name for PCBs in the United States is "Aroclor." 21 CFR § 500.45(a) ("Polychlorinated biphenyls (PCBs) represent a class of toxic industrial chemicals manufactured and sold under a variety of trade names, including Aroclor (United States)").

5. Aroclor is a name that was trademarked by Monsanto.

6. "Between 1929 and 1977, more than 1.25 billion pounds of PCBs were produced in the United States." Agency for Toxic Substances and Disease Registry (ATSDR). 2014. Case Studies in Environmental Medicine: Polychlorinated Biphenyls (PCBs) Toxicity. Atlanta, GA: U.S. Department of Health and Human Services, at 21, available at https://www.atsdr.cdc.gov/csem/csem.asp?csem=30&po=10, last visited on November 7, 2017.

B. Monsanto's PCBs are "extremely toxic" synthetic chemicals.

1. "PCBs are extremely toxic to humans and wildlife." *Environmental Defense Fund v. Environmental Protection Agency*, 636 F.2d 1267, 1270 (D.C. Cir. 1980).

2. PCBs are a "keystone pollutant" and "a prime motivator for the enactment

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of TSCA," the Toxic Substances Control Act. "By most accounts, PCBs are the archetypical chemical villains against which the contemporary pollution laws are directed." William H. Rodgers, Jr. and Elizabeth Burleson, *Polychlorinated biphenyls (PCBs)*, 3 Envtl. L. (West) §6:9 (July 2017) (internal citations omitted).

3. By the late 1970s, the United States banned the "manufacture, processing, distribution in commerce, and use of polychlorinated biphenyls (PCBs)." 44 Fed. Reg. 31514 (May 31, 1979). The ban remains in effect. "The TSCA prohibits the manufacture, processing, distribution, and use (other than in a 'totally enclosed manner') of polychlorinated biphenyls (PCBs) unless the EPA determines that the activity will not result in an 'unreasonable risk of injury to health or the environment.'" *General Electric Co. v. EPA*, 290 F.3d 377 (D.C. Cir. 2002) (holding that an EPA-issued guidance document was a legislative rule requiring prior notice and opportunity for public comment), citing 15 U.S.C. § 2605(e) (2) & (3).

4. PCBs are "among the most stable chemicals known and decompose very slowly once they are in the environment... In the environment, **PCBs are toxic at low concentrations to a wide variety of species**, marine mammals included. Once PCBs reach the environment, they tend to stay there, or move slowly in damaging cycles…" William H. Rodgers, Jr. and Elizabeth Burleson, *Polychlorinated biphenyls (PCBs)*, 3 Envtl. L. (West) §6:9 (July 2017) (emphasis added), citing in part Response to Exemption Petitions, 50 Fed. Reg. 35,184 (August 29, 1985) ("**PCBs are also toxic to mammals at very low exposure levels.** The survival rate and reproductive success of fish can be adversely affected in the presence of PCBs. Various sublethal physiological effects attributed to PCBs have been recorded in the literature") (emphasis added); *see also* 21 CFR § 500.45(a) ("Since PCBs are toxic chemicals, the PCB contamination of food as a result of these and other incidents represent a hazard to public health.").

5. "For humans, exposures cause acute effects such as skin rashes, vomiting, abdominal pain, and temporary blindness and are suspected of causing birth defects, miscarriages, and cancer." William H. Rodgers, Jr. and Elizabeth Burleson,

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Polychlorinated biphenyls (PCBs), 3 Envtl. L. (West) §6:9 (July 2017) (internal citations omitted). *See also Solutia, Inc. v. McWane, Inc*., 726 F. Supp. 2d 1316, 1319 (N.D. Ala. 2010) ("PCBs have been found to cause cancer, decreased fertility, still births, and birth defects in test animals.") (Monsanto cleanup contribution case), citing *Dickerson, Inc. v. United States,* 875 F.2d 1577, 1579, 1583 (11th Cir.1989) ("PCBs are highly toxic chemicals frequently used in electrical transformers… Scientists have found PCB concentrations far below those involved in this case to cause cancer, decreased fertility, still births, and birth defects in test animals.") (affirming judgment against the United States for PCB liability). Both *Solutia, Inc.* and *Dickerson* cited *Environmental Defense Fund v. Environmental Protection Agency,* 636 F.2d 1267 (D.C. Cir. 1980), *infra.*

6. The *Environmental Defense Fund* decision summarized research available to the scientific community by the late 1970s:

> Polychlorinated biphenyls (PCBs) have been manufactured and used commercially for fifty years for their chemical stability, fire resistance, and electrical resistance properties. They are frequently used in electrical transformers and capacitors. However, PCBs are extremely toxic to humans and wildlife. The extent of their toxicity is made clear in the EPA Support Document accompanying the final regulations, in which the EPA Office of Toxic Substances identified several adverse effects resulting from human and wildlife exposure to PCBs.
>
> Epidemiological data and experiments on laboratory animals indicate that exposure to PCBs pose carcinogenic and other risks to humans. Experimental animals developed tumors after eating diets that included concentrations of PCBs as low as 100 parts per million (ppm). Experiments on monkeys indicate that diets with PCB concentrations of less than ten ppm reduce fertility and cause still births and birth defects. Other data show that PCBs may adversely affect enzyme production, thereby interfering with the treatment of diseases in humans. Support Document, *supra* note 4, at 9-18.
>
> EPA has found that PCBs will adversely affect wildlife as well as humans. Concentrations below one ppb (part per billion) are believed to impair reproductivity of aquatic invertebrates and fish. Some birds suffered "severe reproductive failure" when fed diets containing concentrations of only ten ppm of PCBs. *Id*. at 19. Because PCBs collect in waterways and bioaccumulate in fish, fish-eating mammals run a special risk of adverse

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effects. Such mammals may have "significantly higher concentrations of PCBs in their tissues than the aquatic forms they feed on." *Id*. at 36.

EPA estimates that by 1975 up to 400 million pounds of PCBs had entered the environment. Approximately twenty-five to thirty percent of this amount is considered "free," meaning that it is a direct source of contamination for wildlife and humans. The rest, "mostly in the form of industrial waste and discarded end use products, is believed to be in landfill sites and thus constitutes a potential source of new free PCBs." *Id*. at 33-34. Other significant sources of PCBs include atmospheric fallout and spills associated with the use or transportation of PCBs. *Id*. at 29.

EPA concluded in the Support Document that "the additional release of PCBs" into the environment would result in widespread distribution of the PCBs and "will eventually expose large populations of wildlife and man to PCBs." *Id*. at 36-37. EPA concluded further that:

> As a practical matter, it is not possible to determine a "safe" level of exposure to these chemicals. Because PCBs are already widely distributed throughout the ***1271** biosphere, they currently pose a significant risk to the health of man as well as that of numerous other living things. As a consequence, any further increase in levels of PCBs in the biosphere is deemed undesirable by EPA.

Id. at 38. Because "PCBs released anywhere into the environment will eventually enter the biosphere ... EPA has determined that any such release of PCBs must be considered 'significant.'" *Id*.

In 1972, Monsanto, the major American manufacturer of PCBs, limited its sales of PCBs to manufacturers of transformers and capacitors. It ceased all manufacture of PCBs in 1977 and shipped the last of its inventory before the end of that year. Today, PCBs are produced in this country only as incidental byproducts of industrial chemical processes. There are no known natural sources of PCBs. *Id*. at 2.

Environmental Defense Fund v. Environmental Protection Agency, 636 F.2d 1267, 1270-71 (D.C. Cir. 1980) (holding, in part, that there was no substantial evidence to support EPA's decision to establish a regulatory cutoff below 50 ppm).

7. The decision made other findings: "Most importantly, EPA expressly found that any exposure of PCBs to the environment or humans could cause adverse effects."

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Environmental Defense Fund, 636 F.2d at 1283-84.

8. **Closed PCB systems develop leaks.** Another issue in the decision related to the regulation of non-enclosed uses of PCBs, such as "carbonless paper, paints, coatings, soaps, and copying ink toners," versus so-called "totally enclosed uses" of PCBs such as "transformers, capacitors, and electromagnets." *Environmental Defense Fund*, 636 F.2d at 1285. The court ruled against the EPA on this artificial distinction because of something that is also true in this case: "put simply, closed systems develop leaks." *Id.* at 1285; *see also* 1286 (witness "recognized that environmental losses can occur through accidental rupture or leakage.").

9. In the years following the ban, the EPA confirmed that PCBs are toxic, may cause reproductive and developmental effects, and may cause tumors ("oncogenic potential") in people exposed:

> *Health effects.* EPA has determined that PCBs are toxic and persistent. PCBs can enter the body through the lungs, gastrointestinal tract, and skin, circulate throughout the body, and be stored in the fatty tissue.
>
> Available animal studies indicate an oncogenic potential, the degree to which would depend on exposure… Further epidemiological research is needed to correlate human and animal data, but EPA finds no evidence to suggest that the animal data would not predict an oncogenic potential in humans.
>
> In addition, EPA finds that PCBs may cause reproductive effects, developmental toxicity, and oncogenicity in humans exposed to PCBs. Available data show that some PCBs have the ability to alter reproductive processes in mammalian species, sometimes even at doses that do not cause other signs of toxicity. Animal data and limited available human data indicate that prenatal exposure to PCBs can result in various degrees of developmental toxic effects. Postnatal effects have been demonstrated in immature animals following exposure to PCBs prenatally and via breast milk.
>
> In some cases chloracne may occur in humans exposed to PCBs. Severe cases of chloracne are painful and disfiguring, and symptoms may persist for an extended time…

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50 Fed. Reg. 35182, 35183-84 (August 29, 1985).

10. The EPA also determined that Monsanto's PCBs are probable human carcinogens. In 1996, the EPA reassessed PCB carcinogenicity based on data related to Aroclors 1016, 1242, 1254, and 1260. The EPA's cancer reassessment was peer reviewed by experts on PCBs, including scientists from government, academia, and industry. U.S. EPA. PCBs: Cancer Does-Response Assessment and Application to Environmental Mixtures (1996). U.S. EPA, Office of Research and Development, National Center for Environmental Assessment, Washington Office, Washington, DC, EPA/600/P-96/001F, 1996, available at https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=12486 (last accessed November 6, 2017).

11. This EPA report found that "[j]oint consideration of cancer studies and environmental processes leads to a conclusion that environmental PCB mixtures are highly likely to pose a risk of cancer to humans." *Id.* at 57. In addition, "PCBs persist in the body, providing a continuing source of internal exposure after external exposure stops. There may be greater-than-proportional effects from less-than-lifetime exposure, especially for persistent mixtures and for early-life exposure." *Id.* at 58-59.

12. The 1996 EPA report also noted that "PCBs also have significant ecological and human health effects other than cancer, including neurotoxicity, reproductive and developmental toxicity, immune system suppression, liver damage, skin irritation, and endocrine disruption. Toxic effects have been observed from acute and chronic exposures to PCB mixtures with varying chlorine content." *Id.* at vi.

13. In 2000, the Agency for Toxic Substances and Disease Registry (ATSDR), issued a public health statement regarding PCB exposure. It noted that "[s]kin conditions, such as acne and rashes, may occur in people exposed to high levels of PCBs… Some studies in workers suggest that exposure to PCBs may also cause irritation of the nose and lungs, gastrointestinal discomfort, changes in the blood and liver, and depression and fatigue." Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for polychlorinated biphenyls (PCBs). Atlanta, GA: U.S.

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Department of Health and Human Services, Public Health Service, at 4. The public health statement summarized experimental animal studies finding liver damage, anemia, acne-like skin conditions, stomach injuries, thyroid injuries, kidney damage, impaired immune system function, behavioral alterations, endocrine disruption, and impaired reproduction. *Id.* at 5.

14. **Children are more vulnerable to PCB exposure.** The 2000 ATSDR statement also summarized studies tending to show effects in PCB-exposed children: low birthweight; problems with motor skills; decreases in short-term memory; and effects on the immune system. *Id.* at 6. The report noted that children are more vulnerable to PCB exposure than adults, although the routes of exposure are the same:

> Children are exposed to PCBs in the same way as are adults: by eating contaminated food, breathing indoor air in buildings that have electrical devices containing PCBs, and drinking contaminated water. Because of their smaller weight, children's intake of PCBs per kilogram of body weight may be greater than that of adults.
> …
> It is possible that children could be exposed to PCBs following transport of the chemical on clothing from the parent's workplace to the home. House dust in homes of workers exposed to PCBs contained higher than average levels of PCBs. PCBs have also been found on the clothing of firefighters following transformer fires. The most likely way infants will be exposed is from breast milk that contains PCBs. Fetuses in the womb are also exposed from the exposed mother.
> ….
> Because the brain, nervous system, immune system, thyroid, and reproductive organs are still developing in the fetus and child, the effects of PCBs on these target systems may be more profound after exposure during the prenatal and neonatal periods, making fetuses and children more susceptible to PCBs than adults.

Id. at 5-6. In addition, "Younger children may be particularly vulnerable to PCBs because, compared to adults, they are growing more rapidly and generally have lower and distinct profiles of biotransformation enzymes, as well as much smaller fat deposits for sequestering the lipophilic PCBs." *Id.* at 381.

15. **Children are not small adults.** The ATSDR toxicological profile for PCBs

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reiterated these developmental concerns while cautioning against the fallacy that children possess the same level of resilience to toxic exposure as adults: "Children are not small adults… Children also have a longer remaining lifetime in which to express damage from chemicals; this potential is particularly relevant to cancer." *Id.* at 380-81.

16. **Workplace PCB exposure can contaminate homes.** The ATSDR statement reiterated that workplace exposure to PCBs can result in the worker's home becoming contaminated with PCBs: "If you are exposed to PCBs in the workplace, it may be possible to carry them home from work… If this is the case, you should shower and changing clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately." *Id.* at 7.

17. **PCB exposure and cardiovascular damage.** A 2011 ATSDR addendum to the toxicological profile for PCBs reported on more recent research, including animal studies showing cardiovascular damage following PCB exposure. Agency for Toxic Substances and Disease Registry (ATSDR). 2011. Addendum to the toxicological profile for polychlorinated biphenyls (PCBs). Atlanta, GA: U.S. ATSDR, Division of Toxicology and Environmental Medicine, at 1.

18. **PCB exposure and type 2 diabetes.** The 2011 addendum reported research that "PCB exposure was strongly related to prevalence of type 2 diabetes mellitus." *Id.* at 2-3.

19. **PCB exposure and deficient immune function.** The 2011 addendum reported research "suggesting possible impaired immunologic development" in children, and the results of another study that "implied that exposure to PCBs is a possible cause of deficient immune function in children." *Id.* at 4.

20. **PCB exposure and neurodegenerative diseases.** The 2011 addendum reported other research "that exposure to PCBs likely has an effect on neurodegenerative diseases for women but not men," including amyotrophic lateral sclerosis (ALS, also known as motor neuron disease), Parkinson's disease, and dementia. *Id.* at 4.

21. **PCB exposure and neurobehavioral effects, anxiety.** The 2011

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addendum reported animal studies research "that exposure to PCBs may exert anxiogenic behavior." *Id.* at 5. An anxiogenic or panicogenic substance is one that causes anxiety.

22. **PCB exposure and central nervous system effects.** The 2011 addendum reported animal studies research showing inhibited and depressed central nervous system effects following PCB exposure. *Id.* at 5-6.

23. **PCB exposure and children's permanent teeth.** The 2011 addendum reported human studies showing "a dose-response relationship between PCB exposure and development enamel defects of permanent teeth in children." *Id.* at 7.

24. **PCB exposure and sexual development.** The 2011 addendum reported human studies research showing impaired sexual development, including a positive association between high total PCB concentrations and cryptorchidism (undescended testicles) in boys. Another study "suggested that even low levels of PCBs had a robust negative impact on gonadal hormones in newborns." *Id.* at 7-8. Another study of girls exposed to PCBs "suggested that even at low levels of estrogenic PCBs, the time to menarche attainment was decreased," and the "median age at menarche for this cohort (138 girls) was 12.2 years." *Id.* at 9. Another study found "that exposure to certain PCB congeners may interfere with human reproductive development" in both boys and girls. *Id.* at 9. Animal studies also found "dose-related prolongation of the estrous cycle in female offspring," and "changes in body weight, body length, tail length, and weights of kidneys, testes, ovaries, and uterus." *Id.* at 9.

25. **Broad spectrum of effects.** A 2014 ATSDR publication stated that occupational exposure to PCBs can result in a "broad spectrum of effects that includes increased levels of some liver enzymes, with possible hepatic damage, chloracne and related dermal lesions, and respiratory problems." Agency for Toxic Substances and Disease Registry (ATSDR). 2014. Case Studies in Environmental Medicine: Polychlorinated Biphenyls (PCBs) Toxicity. Atlanta, GA: U.S. Depart. of Health and Human Services, at 39, available at https://www.atsdr.cdc.gov/csem/csem.asp?csem=30&po=10, last visited on November 7, 2017. The following information references this 2014

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ATSDR publication.

26. **Acute exposure to PCBs.** Signs and symptoms of acute exposure to PCBs can include chloracne, eye irritation, nausea, vomiting, and elevated liver enzymes and altered liver function. *Id.*at 55-56.

27. **Chronic exposure to PCBs.** Signs and symptoms of chronic exposure to PCBs can include abdominal pain, anorexia, jaundice, nausea, vomiting, weight loss, uroporphyria, headache, dizziness, and edema. *Id.* at 56-57.

28. **Toxic responses to PCBs.** Animal studies have shown that "commercial PCBs elicit a broad range of toxic responses including:

- Acute lethality,
- Body weight loss,
- Carcinogenesis,
- Dermal toxicity,
- Fatty liver,
- Genotoxicity,
- Hepatomegaly,
- Immunosuppressive effects,
- Neurotoxicity,
- Porphyria,
- Reproductive and developmental toxicity,
- Thymic atrophy, and
- Thyroid hormone-level alterations."

Id. at 39-40.

29. **Dermatological effects.** "Conclusive evidence that exposure to PCBs induces adverse dermal effects in humans exists":

> Chloracne and related dermal lesions have been reported in workers occupationally exposed to PCBs.
> …
> The chin, periorbital, and malar areas are most often involved, although lesions might also appear in areas not usually affected by acne vulgaris (e.g., the chest, arms, thighs, genitalia, and buttocks). The most distinctive lesions are cystic and measure 1-10 mm, although comedonal lesions can also be present.
> …
> Chloracne generally indicates systemic toxicity and can be caused by not

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> only dermal contact but also ingestion of PCBs… Chloracne typically develops weeks or months after exposure. The lesions are often refractory to treatment and can last for years or decades.
>
> In addition to chloracne, other dermal effects noted some PCB-exposed workers include pigmentation disturbances of skin and nails, erythema and thickening of the skin, and burning sensations.

Id. at 41-42 (internal citations omitted).

30. **Reproductive and developmental effects.** "Reproductive function may be disrupted by exposure to PCBs," and "neurobehavioral and development deficits have been reported in newborns exposed to PCBs in utero." *Id.* at 45. Children born to women exposed to PCBs exhibited statistically significant decreases in gestational age, birth weight, and head circumference. *Id.* at 43. Higher levels of PCB exposure correlated with weaker reflexes, greater motor immaturity, and more pronounced startle responses. *Id.* at 43-44. Follow-up studies of the children of that cohort "demonstrated that the effects of perinatal exposure to PCBs are persistent." *Id.* at 44. At four years of age, the children still had deficits in weight gain, depressed responsiveness, and reduced performance on the visual recognition memory test. *Id.* at 44. "At 11 years of age, the children of highly exposed mothers were three times more likely than controls to have low full-scale IQ scores; twice as likely to lag behind at least 2 years in reading comprehension; and more likely to have difficulty paying attention." *Id.* at 44 (internal citation omitted).

31. **Endocrine effects.** "The epidemiological studies suggest a link between exposure to PCBs and thyroid hormone toxicity in humans." *Id.* at 46. "Thyroid hormones are essential for normal behavioral, intellectual, and neurologic development. Thus, the deficits in learning, memory, and attention processes among the offspring of women exposed to PCBs are partially or predominantly mediated by alterations in hormonal binding to the thyroid hormone receptor." *Id.* "Recent studies in populations exposed to PCBs and chlorinated pesticides found a dose-dependent elevated risk of diabetes." *Id.*

32. **Hepatic effects.** "Although liver damage is common in animals exposed to

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PCBs, overt hepatotoxicity is uncommon in humans. Exposure to PCBs can increase serum levels of hepatic enzymes and can induce microsomal enzyme function." *Id.* at 46-48.

33. **Neurological effects.** Adults exposed to PCBs have been shown to have significantly greater motor retardation; poorer results on certain memory and attention tests; and higher scores on standardized confusion scale than did control adults. *Id.* at 51.

34. **Additional adverse effects.** "Occupational and epidemiologic studies have suggested or demonstrated other adverse health effects from exposure to PCBs," including cardiovascular, gastrointestinal, genetic, immune, musculoskeletal, and neurological systems. *Id.* at 51-52.

35. **Additional signs and symptoms.** The ATSDR "advises patients to consult their physicians if they develop signs or symptoms of PCB exposure such as: appetite loss; joint pain; nausea; skin disorders, changes, or discoloration; breast changes or lumps; and/or stomach distress and pain." *Id.* at 68.

36. **Highly toxic PCDDs and PCDFs.** "Occupational exposure to PCBs may be accompanied by exposure to chlorinated dibenzodioxin and dibenzofuran contaminants, which are much more toxic than PCBs in comparative animal studies. These substances can cause chronic fatigue and elevated liver enzymes." *Id.* at 57.

37. **PCBs are a "probable human carcinogen."** The Department of Health and Human Services and the Environmental Protection Agency "consider PCBs a probable human carcinogen." *Id.* at 51. In addition, and "on the basis of sufficient evidence of carcinogenicity in humans and experimental animals, the IARC [International Agency for Research on Cancer] classified PCBs as carcinogenic to humans." *Id*. PCB exposure has been linked to cancers of the liver, gallbladder, biliary tract, brain, stomach, intestinal, thyroid, myeloma (cancer of plasma cells, which can damage the bones, immune system, kidneys, and red blood cell count), non-Hodgkin lymphoma (a cancer that starts in the lymphatic system), and the skin, such as malignant melanomas. *Id.* at 48-50. In addition, "data from animal studies have shown that PCBs

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cause gastrointestinal tract tumors, hepatocarcinomas, leukemia, lymphomas, and pituitary tumors." *Id.* at 50.

38. **IARC: "PCBs are carcinogenic to humans."** In 2016, the International Agency for Research on Cancer published an assessment on the carcinogenicity of PCBs. International Agency for Research on Cancer. IARC monographs on the evaluation of carcinogenic risks to humans, volume 107. Polychlorinated and Polybrominated Biphenyls (2016), available at http://monographs.iarc.fr/ENG/Monographs/vol107/index.php (last accessed November 6, 2017. The IARC report concluded, "There is *sufficient evidence* in humans for the carcinogenicity of polychlorinated biphenyls (PCBs). PCBs cause malignant melanoma. Positive associations have been observed for non-Hodgkin lymphoma and cancer of the breast... PCBs are *carcinogenic to humans.*" *Id.* at 439 (emphasis in original).

39. **Wide range of cancers and lesions.** Animal and human studies show associations between PCB exposure and other cancers and lesions not specifically enumerated above. These can include prostate cancer, testicular cancer, pancreatic cancer, lung cancer, mouth cancer, uterine cancer, and non-neoplastic lesions of the liver, thyroid gland, ovary, oviduct, uterus, lung, adrenal cortex, pancreas, kidney, heart, thymus, spleen, clitoral gland, mesenteric artery, oral mucosa, bone marrow, and bladder. *See, e.g.,* Agency for Toxic Substances and Disease Registry (ATSDR). 2011. Addendum to the toxicological profile for polychlorinated biphenyls (PCBs). Atlanta, GA: U.S. ATSDR, Division of Toxicology and Environmental Medicine, at 10-14.

C. Monsanto knew PBCs were toxic, but promoted them without warnings.

1. "Monsanto was well aware of scientific literature published in the 1930s that established that inhalation of PCBs in industrial settings resulted in toxic systemic effects in humans." State of Washington's Complaint for Damages against Monsanto, p. 12, ¶ 49, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016).

2. A 1937 Monsanto memorandum advised that "Experimental work in animals shows that prolonged exposure to Aroclor vapors evolved at high temperatures or

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by repeated oral ingestion will lead to systemic toxic effects. Repeated bodily contact with the liquid Aroclors may lead to an acne-form skin eruption." *Id.* at ¶ 50; *see* Sky Valley Complaint, **Exhibit B** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-2 (E.D. Wash. July 31, 2015), MONS 061332).

3. A 1955 memorandum entitled "AROCLOR TOXICITY" by Monsanto Medical Director Emmet Kelly summarized Monsanto's position on PCB toxicity: "We know Aroclors are toxic but the actual limit has not been precisely defined. It does not make too much difference, it seems to me, because our main worry is what will happen if an individual develops any type of liver disease and gives a history of Aroclor exposure. I am sure the juries would not pay a great deal of attention to MACs [maximum allowable concentrates]." State of Washington's Complaint for Damages against Monsanto, p. 12, ¶ 51, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016); *see* Sky Valley Complaint, **Exhibit C** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-3 (E.D. Wash. July 31, 2015), MONS 095196-97) at 2.

4. A 1955 "CONFIDENTIAL" memorandum by Monsanto's Medical Department stated that workers should not be allowed to eat lunch in the Aroclor department. Three reasons were provided, including the fact that "Aroclor vapors and other process vapors could contaminate the lunches unless they were properly protected." *See* Sky Valley Complaint, **Exhibit D** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-4 (E.D. Wash. July 31, 2015) at 2.

5. In addition, after noting that "the chance of contaminating hands and subsequently contaminating the food is a definite possibility," the Medical Department stated that

> It has long been the opinion of the Medical Department that eating in process departments is a potentially hazardous procedure that could lead to serious difficulties. While the Aroclors are not particularly hazardous from our own experience, this is a difficult problem to define because **early literature work claimed that chlorinated biphenyls were quite toxic materials by ingestion or inhalation.** In any case where a workman claimed physical harm from any contaminated food, it would be extremely difficult on the basis of past literature reports to counter such claims.

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Id. (emphasis added); *see also* State of Washington's Complaint for Damages against Monsanto, pp. 12-13, ¶ 52, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016).

6. A 1957 internal memorandum by Monsanto Medical Director Emmet Kelly reported that, after it conducted its own tests, the U.S. Navy decided against using Monsanto's Aroclors: "No matter how we discussed the situation, it was impossible to change their thinking that [Aroclor-containing] Pydraul 150 is just too toxic for use in a submarine." State of Washington's Complaint for Damages against Monsanto, p. 13, ¶ 53, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016); *see* Sky Valley Complaint, **Exhibit E** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-5 [E.D. Wash. July 31, 2015]) at 2.

7. Therefore, by the 1950s, Monsanto knew that its PCBs a/k/a "Aroclors are toxic but the actual limit has not been precisely defined." *Supra* at ¶ V.C.3. Perhaps reflecting on this, Monsanto's Medical Director Kelly made the reasonable observation that "juries would not pay a great deal of attention" to exposure limits set by the industry. *Id.* This is reasonable because so-called exposure limits have not been based on human subject testing, which would be unethical. Instead, the industry extrapolated so-called human exposure limits from laboratory tests of small mammals like rats, guinea pigs, rabbits, and dogs, who have a limited ability to report or demonstrate complaints following PCB exposure before dying—or being killed—and then dissected for the pathological examination of lesions. *See, e.g.*, **Exhibits L** and **R**. Regardless, Monsanto also knew that "early literature work claimed that chlorinated biphenyls were quite toxic materials by ingestion or inhalation." *Supra* at ¶ V.C.5.

8. In 1966 or 1967, Monsanto Medical Director Emmet Kelly reviewed a scientific presentation by University of Stockholm researcher Soren Jensen, who stated that PCBs "appear to be the most injurious chlorinated compounds of all tested." *See* Sky Valley Complaint, **Exhibit F** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-6 [E.D. Wash. July 31, 2015]), at JDGFOX00000038 (at

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bottom). Researcher Jensen referred to a 1939 study associating PCBs with the deaths of three young workers and concluding that "pregnant women and persons who have at any time had any liver disease are particularly susceptible." *Id.* at JDGFOX00000039. Monsanto Medical Director Kelly did not dispute the researcher's remarks, noting in the 1967 letter to the Research Division of National Cash Register, that "As far as the section on toxicology is concerned, it is true that chloracne and liver trouble can result from large doses." *Id.* at JDGFOX00000037; *see also* State of Washington's Complaint for Damages against Monsanto, p. 13, ¶ 54, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016). Medical Director Kelly did not define the term "large doses."

9. By the latter half of the 1960s, Monsanto became aware that PCBs were causing widespread contamination of the environment. *See* Sky Valley Complaint, **Exhibits G, H,** and **L** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-7, 1-8, 1-13 [E.D. Wash. July 31, 2015]); *see also* State of Washington's Complaint for Damages against Monsanto, p. 14, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016).

10. Despite the growing evidence of harm caused to living things by PCB contamination, Monsanto remained steadfast in its production of PCBs. *See* State of Washington's Complaint for Damages against Monsanto, p. 19, ¶ 60, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016).

11. In March of 1969, Monsanto employee W.M. Richard wrote a memorandum entitled "AROCLOR WILDLIFE ACCUSATIONS" to Monsanto employee Elmer Wheeler. *See* Sky Valley Complaint, **Exhibit I** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-9 [E.D. Wash. July 31, 2015]), Bates No. MONS 096509-11. In the memorandum, Richard responded to a 1968 article in *Nature* criticizing PCBs as being (in Richard's paraphrasing) "a pollutant… a toxic substance—with no permissible allowable levels… [and] a toxic substance endangering man himself, implying that the [extinction] of the peregrine falcon is a leading indicator of things to come." *Id.* at MONS 096509. Richard also responded to a 1969 article in

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Science regarding the Environmental Defense Fund's legal strategy, which Richard summarized in part by writing that

> These people at EDF are saying we must not put stress on any living thing through a change in air or water environment. Eagles, plant life, anything which lives or breathes. This group is pushing hard on the extension of the word harmful. They claim 'enzyme inducer' activity is the real threat of DDT and PCB's and are using these arguments to prove that very small amounts of chlorinated hydrocarbons are 'harmful.'

Id. (emphasis in original). Richards also explained that Monsanto could take steps to reduce PCB releases from its own factories, but he cautioned that "It will be still more difficult to control other end uses such as cutting oils, adhesives, plastics, and NCR paper. In these applications, exposure to consumers is greater and the disposal problem becomes complex." *Id.* at MONS 096510; *see also* State of Washington's Complaint for Damages against Monsanto, pp. 14-15, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016).

12. During this time period, "the coordination of the Division effort has been principally the responsibility W.R. Richard and E.P. Wheeler with support from R.E. Keller and Cumming Paton." *See* Sky Valley Complaint, **Exhibit M** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-13 [E.D. Wash. July 31, 2015]), Bates No. DSW 014623.

13. In September of 1969, Monsanto employee W.R. Richard wrote an interoffice memorandum entitled "DEFENSE OF AROCLOR." *See* Sky Valley Complaint, **Exhibit J** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-10 [E.D. Wash. July 31, 2015]), Bates No. DSW 014256-63. The memorandum set out Monsanto's general policy on defending litigation against the public: "Make the Govt., States and Universities prove their case." The memorandum acknowledged, however, that Monsanto

> can't defend vs. everything. **Some animals or fish or insects will be harmed.** Aroclor degradation rate will be slow. Tough to defend against. Higher chlorination compounds will be worse [than] lower chlorine

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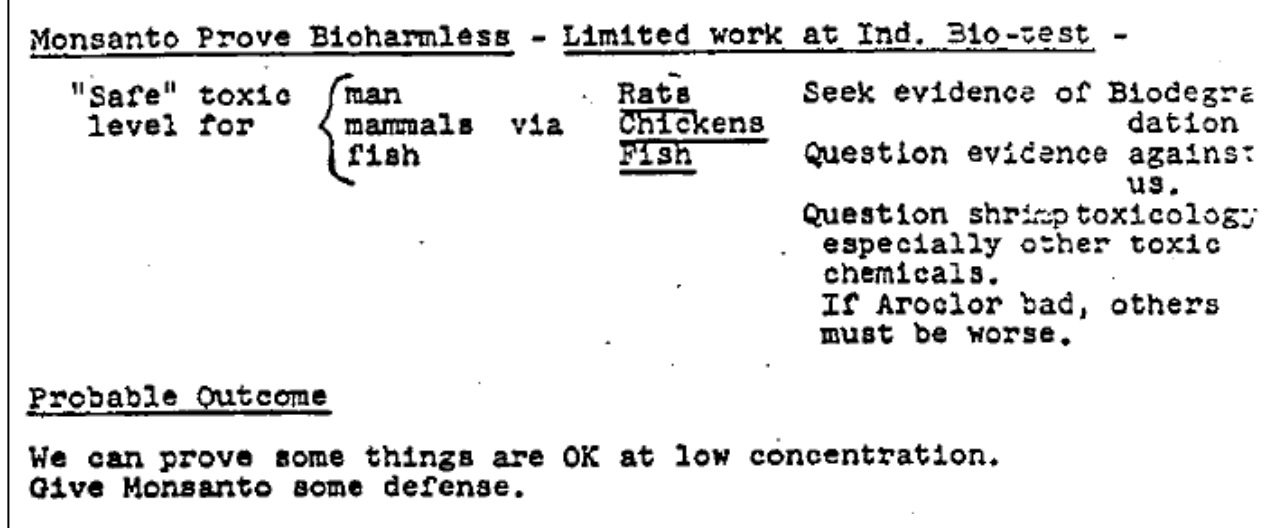
compounds. Therefore we will have to restrict uses and clean-up as much as we can, starting immediately.

Id. at DSW 014256 (emphasis added). Based on this, Monsanto knew by the late 1960s that "some animals or fish or insects will be harmed" in the general environment, where PCB contamination is low and diffuse—as opposed to PCB contamination in a more enclosed space such as a classroom, as shown below. The 1969 memorandum also outlined Monsanto's plans for challenging scientific studies of the toxicity of PCBs:



Monsanto Prove Bioharmless - Limited work at Ind. Bio-test -

"Safe" toxic level for { man / mammals / fish } via { Rats / Chickens / Fish }

Seek evidence of Biodegradation

Question evidence against us.

Question shrimp toxicology especially other toxic chemicals.

If Aroclor bad, others must be worse.

Probable Outcome

We can prove some things are OK at low concentration.
Give Monsanto some defense.

Id. at DSW 014256. The memorandum also outlined Monsanto's own plans for chronic toxicity studies using animals. *Id.* at DSW 014262-63; *see also* State of Washington's Complaint for Damages against Monsanto, p. 15, ¶ 60, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016).

14. In January of 1970, Elmer Wheeler of Monsanto's Medical Department circulated laboratory results of its animal studies. The memorandum was entitled "Status of Aroclor Toxicological Studies." *See* Sky Valley Complaint, **Exhibit K** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-11 [E.D. Wash. July 31, 2015]), Bates No. MONS 098480. Wheeler stated, "Our interpretation is that **the PCBs are exhibiting a greater degree of toxicity in this chronic study than we had anticipated.** Secondly, although there are variations depending on species of animals, the PCBs are about the same as DDT in mammals." *Id.* (emphasis added).

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15. Monsanto expressed a desire to keep profiting from PCBs despite the research showing PCB toxicity. *See* Sky Valley Complaint, **Exhibit A**. In the "PCB Presentation to Corporate Development Committee," Monsanto stated that "Do[ing] nothing was considered unacceptable from a legal, moral, customer, public relations & company policy viewpoint." *Id.* at MONS 058737. But the alternative of stopping PCB production and promotion, and instead going out of the Aroclor business, "was considered unacceptable from a Divisional viewpoint… there is too much customer/market need and selfishly too much Monsanto profit to go out." *Id*.

16. Monsanto formed an internal Aroclor Ad Hoc Committee whose objectives, "agreed to by the Committee," were to "submit recommendations for action which will: 1. Permit continued sales and profits of Aroclors and Terphenyls. 2. Permit continued development of uses and sales. 3. Protect image of Organic Division and of the Corporation." State of Washington's Complaint for Damages against Monsanto, pp. 15-16, ¶ 62, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016); *see* Sky Valley Complaint, **Exhibit L** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-12 [E.D. Wash. July 31, 2015]), Bates No. MONS 030483-86 ("CONFIDENTIAL MINUTES OF AROCLOR 'AD HOC' COMMITTEE"). Monsanto set these business objectives despite knowing that PCBs had been found in the environment, wildlife, and the food chain, as PCBs "may be a global contaminant." *Id.* In these confidential minutes, Monsanto recognized the problem of PCB "environmental contamination by customers." *Id.* at MONS 030485 ("Our in-plant problems are very small vs. problems of dealing with environmental contamination by customers.").

17. In October of 1969, Monsanto's Aroclor "Ad Hoc" Committee issued its confidential report. *See* Sky Valley Complaint, **Exhibit M** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-13 [E.D. Wash. July 31, 2015]), Bates No. DSW 014612-24. The committee reported environmental PCB contamination causing the killing of marine species and the possible extinction of several species of birds. *Id.* at DSW 014615. In addition, "the committee believes that there is no ~~possible~~

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practical course of action that can so effectively police the uses of these products as to prevent completely some environmental contamination." *Id.* (underscore and strikethrough in original). The report outlined a plan to protect Monsanto's corporate interests: "There are, however a number of ~~possible~~ actions which must be undertaken in order to prolong the manufacture, sale, and use of these particular Aroclors as well as to protect the continued use of other members of the Aroclor series." *Id.* (strikethrough and underscore in original).

18. The committee offered recommendations, including notifying PCB "customers of environmental contamination problems." *Id.* at DSW 014616. The basis for the recommendation, in part, concerned reports of PCB environmental contamination and Monsanto's knowledge of the mechanisms of PCB releases:

> It has been recognized from the beginning that other functional fluid uses could lead to losses of the Aroclors to liquid waste streams from the customers' plants. Losses could occur from spills, unusual leakage of large volumes and daily losses of smaller volumes.
>
> It has also been recognized that there could be vapor losses but it has been felt that these were perhaps of less significance than the vapor losses in plasticizer applications. The concern for vapor losses rises from the published proposed theory that even minute quantities of vapors are eventually transferred to the water environment and accumulated therein.
>
> Another possible source of air environmental contamination is the eventual destruction of materials which have Aroclors in them. Of particular significance might be the burning or partial incineration of waste or used products containing the Aroclors.

Id. at DSW 014618.

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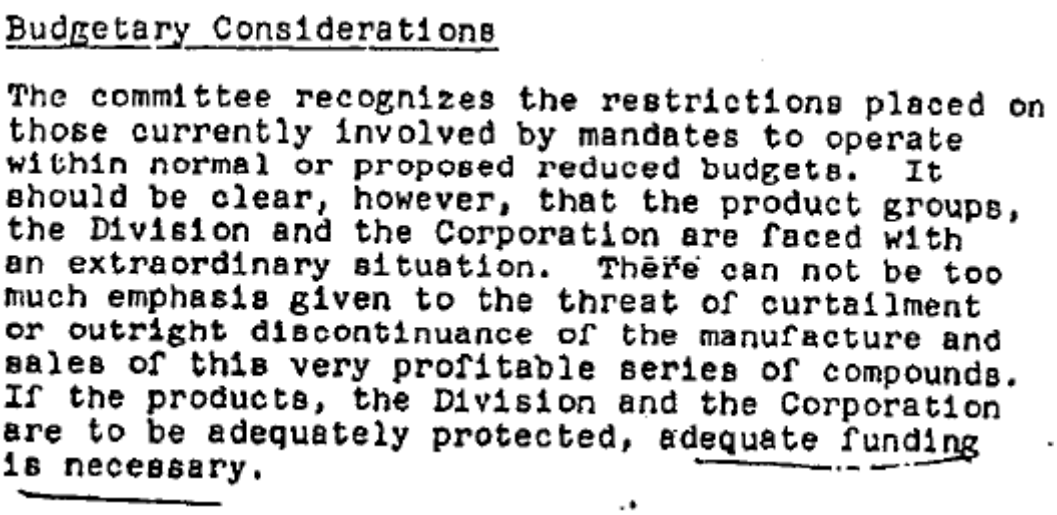
19. Despite the environmental damage caused by its PCB products, Monsanto was clearly concerned about losing the production of PCBs and the associated "sales of this very profitable series of compounds":



Budgetary Considerations

The committee recognizes the restrictions placed on those currently involved by mandates to operate within normal or proposed reduced budgets. It should be clear, however, that the product groups, the Division and the Corporation are faced with an extraordinary situation. There can not be too much emphasis given to the threat of curtailment or outright discontinuance of the manufacture and sales of this very profitable series of compounds. If the products, the Division and the Corporation are to be adequately protected, adequate funding is necessary.

Id. at DSW 014624.

20. Therefore, by 1970, the escape of PCBs into surrounding environments and the resulting contamination was not only reasonably foreseeable, but the problem was known to Monsanto. In addition, the escape of Monsanto's PCBs *by PCB customers and users* into surrounding environments was not only reasonably foreseeable, but was known to Monsanto. *See also* State of Washington's Complaint for Damages against Monsanto, pp. 23-24, ¶ 99, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016).

21. By 1970, Monsanto also knew that its PCBs exhibited a greater degree of toxicity than Monsanto previously anticipated. *Supra* at ¶ V.C.14.

22. Despite this knowledge, Monsanto chose not to warn its customers and the public regarding the human health dangers of Monsanto's PCBs. Any statements made by Monsanto in that regard have been insufficient to convey the actual dangers posed by PCBs. Instead, Monsanto's efforts were and continue to be focused on protecting its own profits.

23. An interoffice memorandum circulated in February of 1970 that provided talking points for discussions by Monsanto representatives with PCB customers.

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Monsanto informed its PCB representatives that Monsanto "can't afford to lose one dollar of business." To that end, Monsanto stated, "We want to avoid any situation where a customer wants to return fluid… We would prefer that the customer use up his current inventory and purchase [new products] when available. He will then top off with the new fluid and eventually all Aroclor 1254 and Aroclor 1260 will be out of his system. We don't want to take fluid back." *See* Sky Valley Complaint, **Exhibit N** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-14 [E.D. Wash. July 31, 2015]), at 2 (emphasis in original); *see also* State of Washington's Complaint for Damages against Monsanto, p. 17, ¶ 67, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016).

24. In roughly this same time period, Monsanto advised public officials that Monsanto's PCBs "are not particularly toxic by oral ingestion or skin absorption" and "infrequent exposure to PCB vapor should not cause ill effects." *See* Sky Valley Complaint, **Exhibits O** and **P** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-15, 1-16 [E.D. Wash. July 31, 2015]); *see also* State of Washington's Complaint for Damages against Monsanto, p. 20, ¶ 76, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016) ("While the scientific community and Monsanto knew that PCBs were toxic and becoming a global contaminant, Monsanto repeatedly mispresented these facts, telling governmental entities the exact opposite—that the compounds were not toxic and that the company would not expect to find PCBs in the environment in a widespread manner.").

25. Monsanto also offered the message to a member of Congress that Monsanto "cannot conceive how the PCBs can be getting into the environment in a widespread fashion." *See* Sky Valley Complaint, **Exhibits Q** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-17 [E.D. Wash. July 31, 2015]); *see also* State of Washington's Complaint for Damages against Monsanto, p. 21, ¶ 79, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016).

26. Monsanto also represented to another governmental official that "Based on

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available data, manufacturing and use experience, we do not believe the polychlorinated biphenyls to be seriously toxic." *See* Sky Valley Complaint, **Exhibit R** (from *City of Spokane v. Monsanto Co.*, Case 2:15-cv-00201-SMJ, ECF No. 1-18 [E.D. Wash. July 31, 2015]) at 3; *see also* State of Washington's Complaint for Damages against Monsanto, p. 21, ¶ 80, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016).

27. Clearly, Monsanto's knowledge of PCB toxicity deepened between the 1930s and the 1970s. Despite its knowledge of PCB toxicity, Monsanto intentionally produced and promoted PCBs "for use in a wide range of industrial and household goods, including electrical equipment, paint, sealants, food cookers, furnaces, floor wax, insecticides, lubricants, moisture-proof coatings, papers, asphalt, leather adhesive, and stucco." *City of Seattle v. Monsanto Co.*, 237 F. Supp. 3d 1096, 1100 (W.D. Wash. 2017).

28. "Though Monsanto was aware of PCBs' toxicity and propensity to leach, it denied or misrepresented those facts to government investigators. Monsanto continued to manufacture, promote, and profit from its PCBs." *Id.* (internal citations omitted) (holding that Seattle's claims against Monsanto for public nuisance and equitable indemnity are not preempted by Washington's Product Liability Act (WPLA); Seattle's common law product liability claims are not preempted by WPLA to the extent they arose on or before 1981; Seattle's claims are not time-barred; **Seattle stated a claim for public nuisance, the court rejecting Monsanto's argument that any intervening acts of third parties cut off proximate causation, because such acts were foreseeable**; Seattle lacked standing to bring product liability claims; Seattle stated a claim for negligence; and Seattle failed to allege facts supporting its claim for equitable indemnity).

29. Monsanto intentionally failed to warn customers and the public regarding the toxicity and hazards of its PCB products. *See, e.g., Nevada Power Co. v. Monsanto Co.*, 955 F.2d 1304, 1306-07 (9th Cir. 1992) ("Nevada Power discovered internal documents of the Manufacturers which Nevada Power contends show that the Manufacturer's understanding of the dangers of PCBs in the 1960s and early 1970s was much more advanced than the general state of knowledge in the scientific community")

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(holding, in part, that it was a fact question as to whether Nevada Power's fraud and failure to warn claims were barred by the Nevada statute of limitations).

30. Monsanto's PCBs were not reasonably safe in construction because they were unsafe—"extremely toxic"—to an extent beyond that which would be contemplated by an ordinary consumer. The extreme toxicity of Monsanto's PCBs was a proximate cause of Plaintiffs' damages.

31. Monsanto's PCBs were not reasonably safe as designed under a balancing test or under a consumer expectations test, which was a proximate cause of Plaintiffs' damages.

32. Monsanto's PCBs were an unavoidably unsafe product, which was a proximate cause of Plaintiffs' damages.

33. Monsanto's PCBs were not reasonably safe due to inadequate warnings when manufactured or after manufacture.

34. Any Monsanto warnings to the non-Monsanto parties in this case at the time of manufacture regarding the extreme toxicity of PCBs, were inadequate and a proximate cause of Plaintiffs' damages.

35. Any Monsanto warnings to the non-Monsanto parties in this case after manufacture—and up to the present day—regarding the extreme toxicity of Monsanto's PCBs, have been inadequate, which was a proximate cause of Plaintiffs' damages.

36. Due to their extreme toxicity, Monsanto's PCBs never had a "useful safe life."

37. Monsanto had actual knowledge of the defect and the danger of its PCBs, but showed complete indifference or conscious disregard for the safety of others by producing and promoting PCBs anyway.

D. PCB-caulking and PCB-light ballasts cause PCB-contamination.

1. Monsanto manufactured PCBs that were incorporated by Monsanto's customers as plasticizers in caulking, paints, and sealants. In these forms, Monsanto's PCBs were used in interior and exterior windows, doors, and masonry joints.

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2. Even today, caulking with high PCB levels are usually still flexible and often largely intact.

3. PCB-caulking emits PCBs, which migrate into the air and nearby materials, including adjoining wood, cement, and brick; air and dust inside schools; soil near school buildings, and other materials and furnishing.

4. The following information comes from a publication of the United States Environmental Protection Agency (2014, pp. 7-9). Thomas, K. (2014). PCBs in school buildings: sensible steps to healthier school environments. Washington, DC: U.S. EPA Office of Research and Development.

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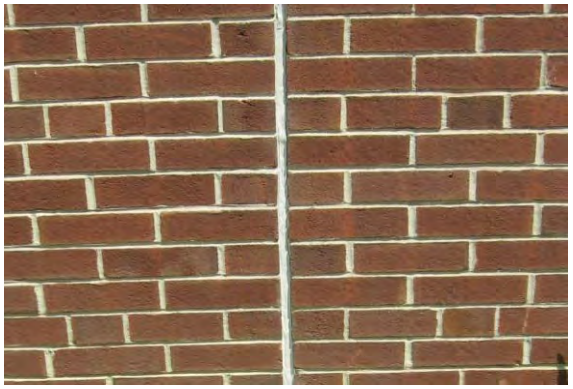
PCB Sources – Caulk and Other Sealants

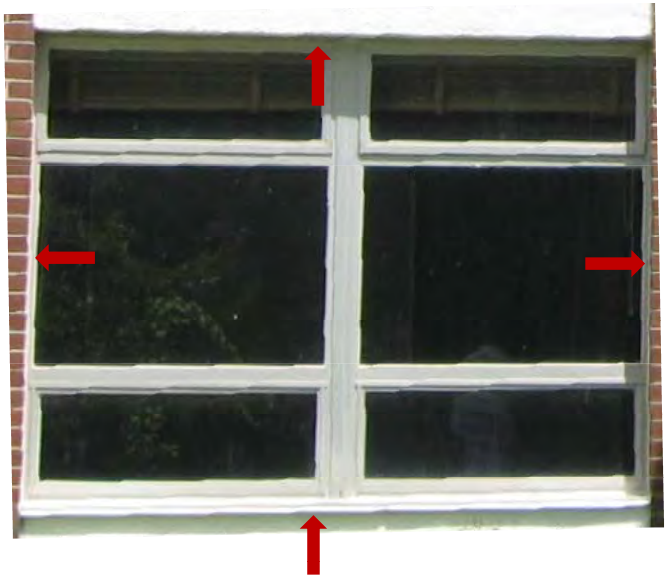


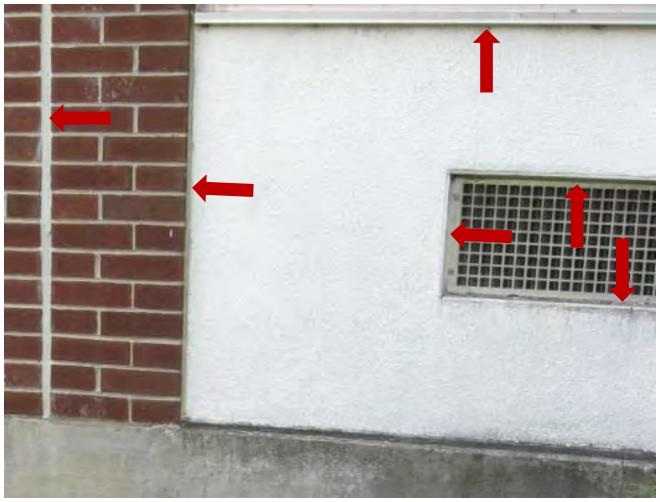
- U.S. Production of Aroclors as a plasticizer ingredient
  - 1958 - 4 million lbs.
  - 1969 - 19 million lbs.
  - 1971 – 0 lbs.
- PCBs were sometimes added to caulk during construction
- Used for
  - Exterior and interior windows and doors
  - Exterior and interior joints
  - Window glazing
  - Other locations/seams (plumbing, casework, etc.)
- Caulk with PCBs > 50 parts per million (ppm) is not an allowed use

PCB Sources – Caulk and Other Sealants

- In several northeastern schools:
  - 18% of 427 interior caulk/sealant samples >50 ppm PCBs
  - 6% of interior samples >100,000 ppm (10% by weight)
  - 63% of 73 exterior caulk/sealant samples >50 ppm PCBs
  - 34% of exterior samples >100,000 ppm
  - Highest level was 440,000 ppm PCBs (44% by weight)
- We have found that caulk with high PCB levels is usually still flexible and often largely intact
- Visual identification of caulk with PCBs is not reliable

PCB Sources – Caulk and Other Sealants





- PCBs in caulk/sealants move over time into:
  - Adjoining wood, cement, brick
  - Air and dust inside schools
  - Soil near school buildings
  - Other materials/furnishings
- Emissions of PCBs into the air can be quite substantial
  - Emissions can create indoor air levels above recommended concentrations
  - As the temperature increases, emissions increase
  - Ventilation is an important factor
- Although installed 40 – 60 years ago, high PCB levels remain and emissions will continue far into the future
- Other PCB sources, like coatings and paints, will act much like caulk in releasing PCBs into the environment

5. As stated by the EPA (*supra*, p. 9), PCB-caulking and other sealants in school buildings can create indoor air levels above recommended concentrations. In addition, "high PCB levels remain and emissions will continue far into the future." *Id.*

6. Monsanto's PCBs were also produced and promoted as components of electrical equipment such as transformers, motor start capacitors, and lighting ballasts.

7. "Commercial PCB mixtures vary from colorless to dark brown oils, and from viscous liquids to sticky resinous semisolids. Although PCBs evaporate slowly at room temperature, the volatility of PCBs increases dramatically with even a small rise in temperature. Equipment that contains PCBs can overheat and vaporize significant quantities of these compounds, creating an inhalation hazard that can be magnified by poor ventilation" (ATSDR, 2014, p. 25).

8. As stated by the State of Washington, "PCBs easily migrate or volatilize out of their original source material or enclosure and contaminate environmental media such as air, soil, stormwater, and sediment. For example, **PCB compounds volatilize out of building materials (such as caulk) and into the surrounding environment. PCBs can also escape from totally enclosed materials (such as light ballasts) and similarly contaminate and damage the environment.**" State of Washington's Complaint for Damages against Monsanto, p. 9, ¶ 37, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016) (emphasis added).

9. As stated by the State of Washington, "PCBs present serious risks to the health of humans… Humans may be exposed to PCBs through ingestion, inhalation, and dermal contact. Individuals may inhale PCBs that are emitted into the air. They may also ingest PCBs that are emitted into air and settle onto surfaces that come into contact with food or drinks. And they may absorb PCBs from physical contact with PCBs or PCB-containing materials." State of Washington's Complaint for Damages against Monsanto, p. 9, ¶ 38-39, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016).

10. **PCB light ballasts release PCBs.** The following information comes from the same EPA publication regarding PCBs in school buildings (EPA, 2014, pp. 10-11):

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PCB Sources – Fluorescent Light Ballasts

- Fluorescent and high intensity light ballast capacitors
  - Prior to 1977 - Many (most?) contained PCBs
  - 1977 – 1978 - Some new ballasts contained PCBs
  - After 1978 - No new ballasts manufactured w PCBs
- Some PCB-containing ballasts remain in place
  - In several northeastern schools, 24% - 95% of the light ballasts likely contained PCBs
- Most PCB-containing ballasts have exceeded their expected lifetimes
- Failure and release of PCBs will continue and may increase

PCB Sources – Fluorescent Light Ballasts

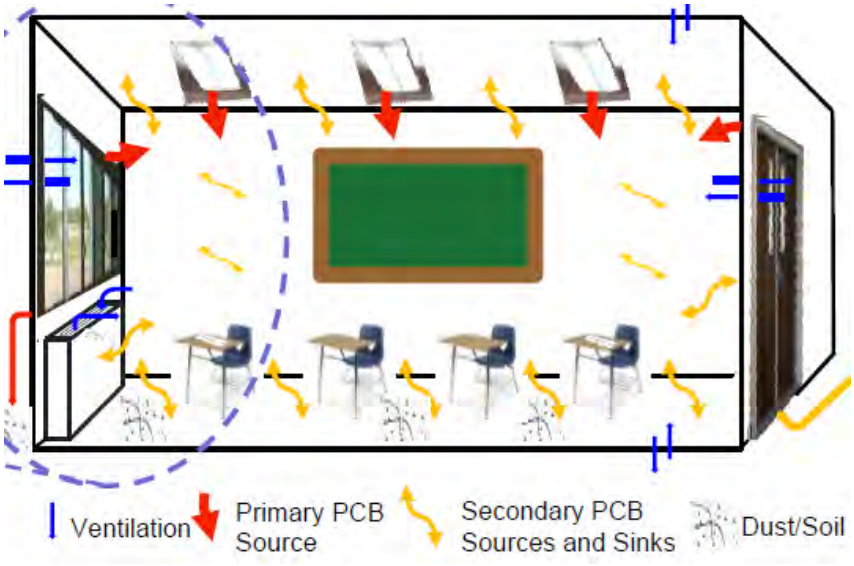
- PCBs are continuously released into the air from intact, functioning light ballasts
  - When lights are off, emissions are low
  - When lights are on, the ballast heats up, and emissions increase several-fold
- PCB ballasts can fail, releasing PCB vapors into the air and liquid PCBs onto surfaces
  - Air levels of PCBs can become quite large
  - Surfaces can be contaminated
  - Significant impact/costs to remediate
- Residues from previously failed ballasts can remain in light fixtures even if the ballast is replaced
  - The impact on PCBs in the school environment has not been determined

As stated (p. 10), PCB-containing light ballasts were manufactured until the late 1970s. ("Light ballasts" are components of light fixtures in buildings.) The "failure and release of PCBs will continue and may increase" in school buildings containing PCB-light ballasts. *Id.* This is because "PCBs are continuously released into the air from intact, functioning light ballasts. When lights are off, emissions are low. When lights are on, the ballast heats up, and emissions increase several-fold." *Id.* at 11.

11. **Failed PCB ballasts cause high levels of PCB contamination.** In addition, "PCB ballasts can fail, releasing PCB vapors into the air and liquid PCBs onto surfaces." *Id.* When that occurs, "Air levels of PCBs can become quite large. Surfaces can be contaminated." *Id.*

12. **Toxic PCDDs and PCDFs.** Also of concern are the extremely toxic chemical byproducts of failing PCB-light ballasts, including dioxins and furans. Failing PCB-ballasts that pyrolyze their PCB contents generate and emit additional toxic chemicals called polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). 50 Fed. Reg. 29,171 (July 17, 1985); *Ahrens v. Pacific Gas & Electric Co.*, 197 Cal.App.3d 1134, 1139, fn 2, 243 Cal.Rptr. 420 (1988).

13. Over time, school building materials become secondary sources of PCB contamination after absorbing PCBs emitting from the primary contamination sources, as illustrated in this diagram and in the following EPA slides (2014, pp. 12, 2):



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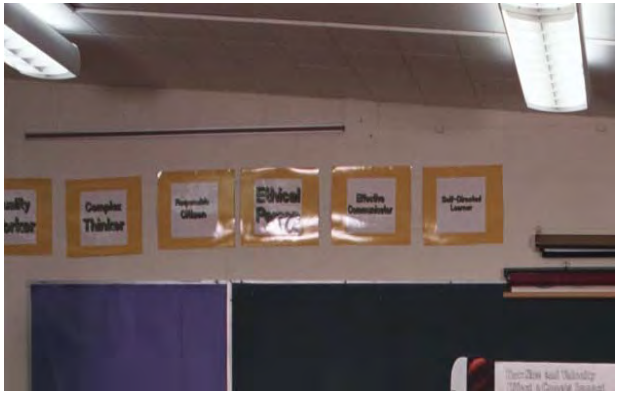
PCB Sources – Secondary Sources/Sinks

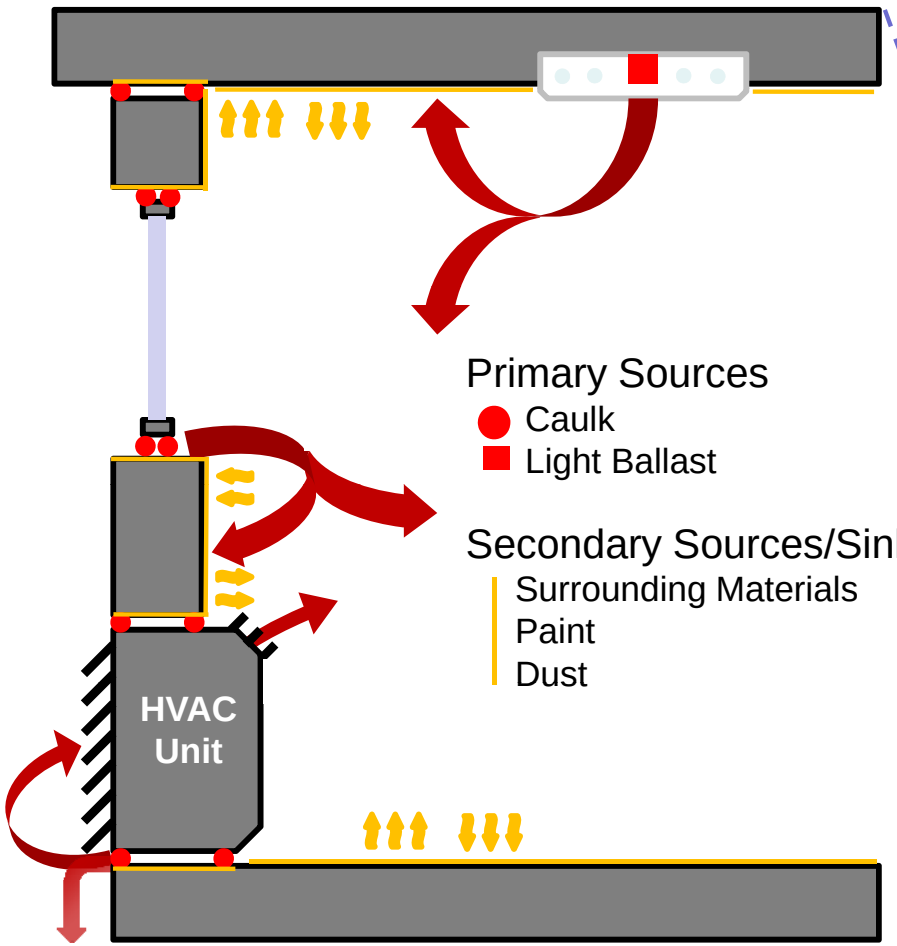


- PCBs released from primary sources are absorbed into other materials in the school environment over time
- Following removal of primary sources, PCBs in secondary sources may be released into the school environment and result in continuing exposures
- In some cases, secondary sources may need to be considered for additional remedial actions following removal/remediation of primary sources

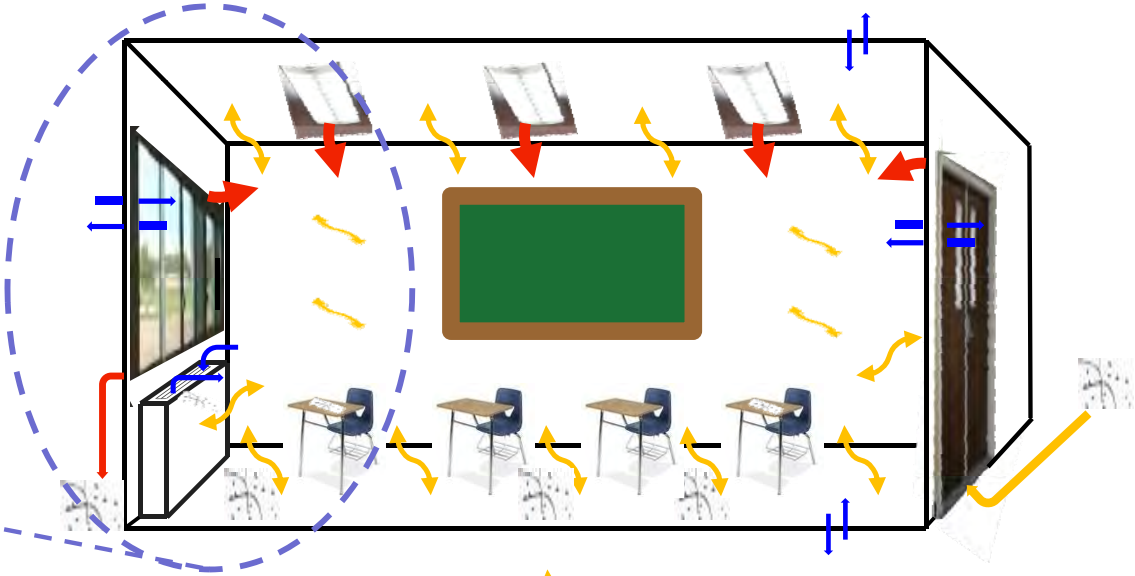
PCBs - A Complex Problem in Buildings

United States Environmental Protection Agency

Example Scenario



- Over 100 PCB chemicals
- Multiple primary sources possible
- Transport from sources to air, surfaces, dust, soil
- Secondary sources created
- Exposures through multiple pathways
- Ventilation and temperature effects



Ventilation | Primary PCB Source | Secondary PCB Sources and Sinks | Dust/Soil

14. For these and other reasons, school buildings should not contain Monsanto's PCBs.

15. When a reasonably careful manufacturer learns that its product is toxic and poses public health hazards, the manufacturer stops manufacturing it, recalls its product, and warns the public about the product.

16. But Monsanto never recalled PCBs, despite knowing their toxicity and danger to public health. Instead, Monsanto continued to promote PCBs, particularly in electrical applications, until PCBs were banned.

17. Monsanto did not warn users of PCBs, such as the State, the School District, Union High, the Health District, or the Plaintiffs, that Monsanto's PCBs are extremely toxic and pose a public health hazard.

18. Monsanto provided the public with no warnings, notices, bulletins, or information that PCBs are extremely toxic and pose a public health hazard. Any information provided by Monsanto during or after manufacture has been inadequate.

19. Monsanto's PCBs have contaminated school buildings in Washington, including the school buildings in this case, causing harm to occupants of the buildings, including the Plaintiffs. As shown above, this was not only reasonably foreseeable, it was actually known to Monsanto that such harm would come to third parties such as the Plaintiffs. Accordingly, the Plaintiffs seek damages against Monsanto.

20. It was also reasonably foreseeable, based on Monsanto's history of experience with PCB customers and users, that some inspectors, owners, operators, providers, or maintainers of buildings would engage in negligent conduct that causes harm to third parties by exposing them to Monsanto's PCBs.

21. Unfortunately, Monsanto's PCBs continue to contaminate school buildings built before 1980, including the school buildings in this case. As shown above, this is because Monsanto intentionally produced and promoted PCBs in a variety of construction applications. As a result of Monsanto's conduct, it was reasonably foreseeable that Monsanto's PCBs would be incorporated in buildings, including the

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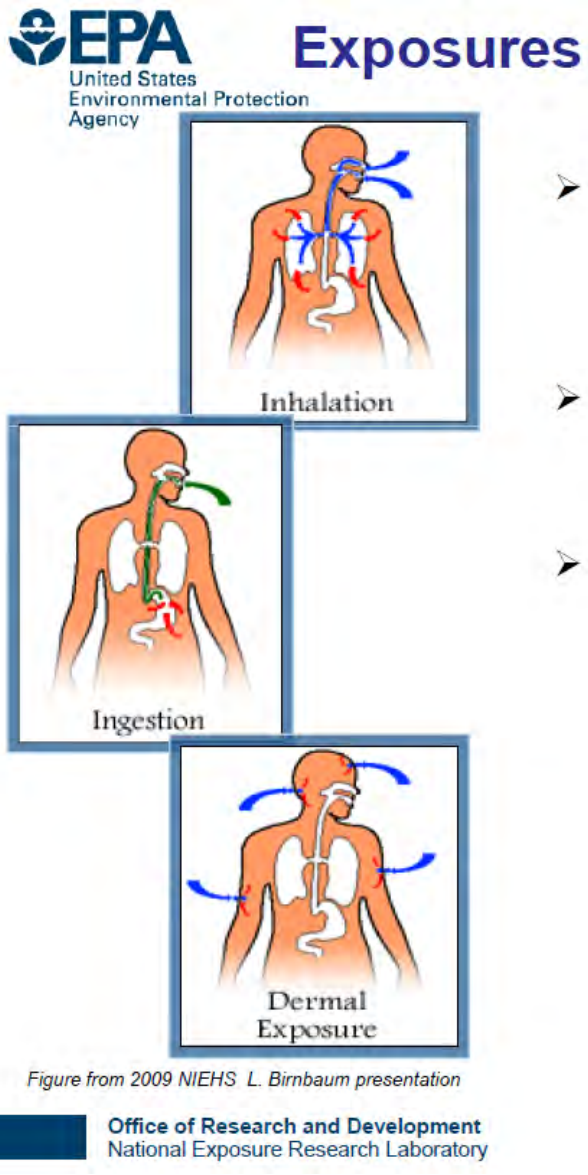
school buildings in this case, and would contaminate classrooms used by people, including the Plaintiffs, causing them damages. Monsanto's PCB contamination of Sky Valley Education Center was a legal cause of injury to the Plaintiffs.

22. As shown in the following EPA slide (2014, p. 16), "Occupants in schools with interior PCB sources will be exposed to PCBs in the indoor air, dust, and on surfaces through their normal activities." For the Plaintiffs and others in such school buildings, "Exposures will occur through inhalation, ingestion, and dermal contact."



The full EPA slide appears on the following page:

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Exposures to PCBs in the School Environment

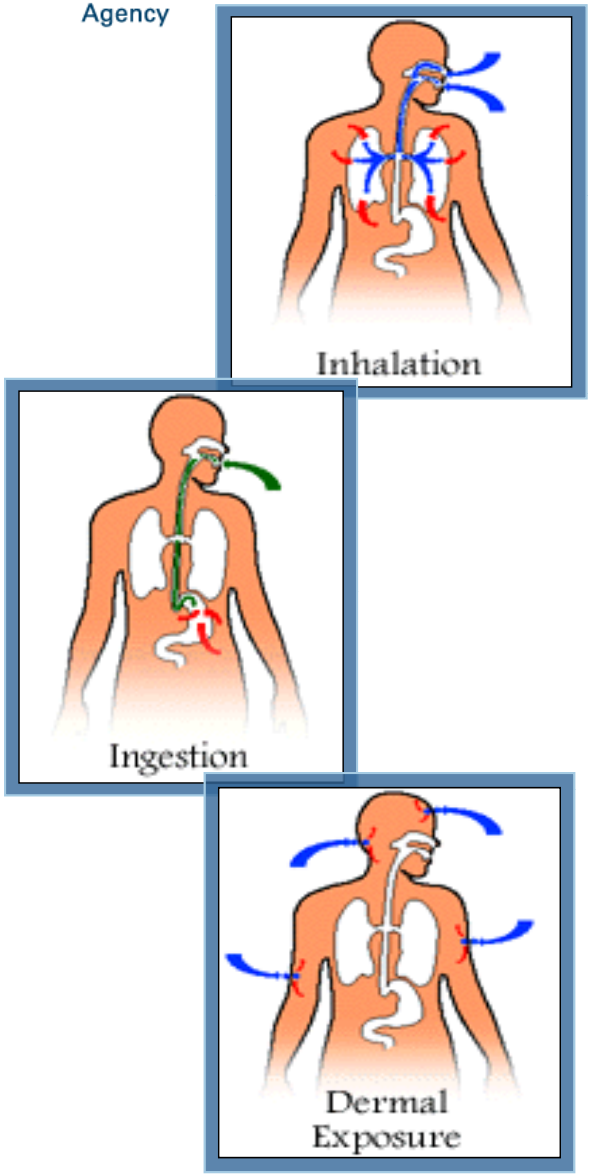


Figure from 2009 NIEHS L. Birnbaum presentation

- Occupants in schools with interior PCB sources will be exposed to PCBs in the indoor air, dust, and on surfaces through their normal activities
- In school buildings with exterior PCB sources, exposures may occur through contact with contaminated soil
- Exposures will occur through inhalation, ingestion, and dermal contact

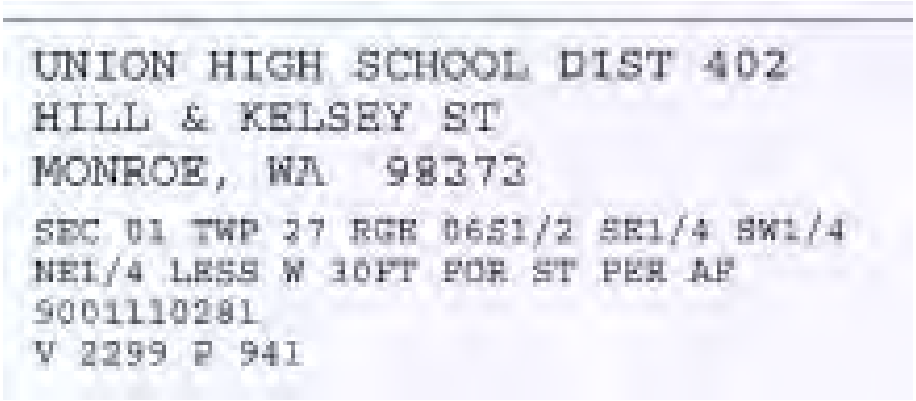
23. As shown in the history below, the Sky Valley Education Center buildings were contaminated with Monsanto's PCBs. This fact was publicly revealed in 2016 following environmental testing done in response to severely sickened and diseased teachers and over one hundred Sky Valley individuals reporting to the Snohomish Health District illnesses related to the school buildings. The Defendants' wrongdoing led to the PCB contamination and caused PCB exposure in the Plaintiffs, causing them damages.

24. "Monsanto's PCB contamination constitutes injury to the State's public natural resources and to other property and waters of the State [of Washington], for which the State seeks damages, including on behalf of itself and on behalf of its residents in its *parens patriae* capacity." State of Washington's Complaint for Damages against Monsanto, p. 5, ¶ 16, Case No. 16-2-29591-6, King County Superior Court (Dec. 8, 2016).

E. The school buildings became toxic, injuring children and adults.

1. **History of the school buildings.** Starting in the 1950s, the school campus located in Monroe at 351 Short Columbia Street, near Hill, Kelsey, and Sams Streets, was known as Monroe Union High School or Monroe High School.

2. Today, the tax accessor records identify the property as belonging to Union High School District 402:


UNION HIGH SCHOOL DIST 402
HILL & KELSEY ST
MONROE, WA 98272
SEC 01 TWP 27 RGE 06S1/2 SE1/4 SW1/4
NE1/4 LESS W 30FT FOR ST PER AF
9001110281
V 2299 P 941

3. The following page is a true and correct copy of a page of this government record, which is also attached as **Exhibit S**:

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27060100102300 UNION HIGH SCHOOL DIST 402 HILL & KELSEY ST,MONROE,WA,98272,USA 681

Tax ID 01270610230003 Printed 08/09/2016 Card No. 1 of 1

UNION HIGH SCHOOL DIST 402
HILL & KELSEY ST
MONROE, WA 98272

SEC 01 TWP 27 RGE 06S1/2 SE1/4 SW1/4
NE1/4 LESS W 30FT FOR ST PER AF
9001110281
V 2299 P 941

Neighborhood Number
5105001

Neighborhood Name
City of Monroe secondary com

TAXING DISTRICT INFORMATION

Jurisdiction Name	Snohomish
Area	001
Corporation	103
Section & Plat	0
Routing Number	2706011

Site Description
Topography

Public Utilities
Water, Sewer, Electric
Street or Road
Paved
Neighborhood

Zoning:
Legal Acres:
4.2900

Transfer of Ownership

Valuation Record

Assessment Year		2010	2011	2012	2013	2014	2015	2016
Reason for Change		Reval	Reval	Reval	Reval	Reval	Reval	Reval
0	L	1401500	1214700	1121200	1121200	1121200	1121200	1214700
	I	6593900	6593900	6593900	6593900	6593900	6593900	6593900
	T	7995400	7808600	7715100	7715100	7715100	7715100	7808600
0	L	0	0	0	0	0	0	0
	I	6593900	6593900	6593900	6593900	6593900	6593900	6593900
	T	6593900	6593900	6593900	6593900	6593900	6593900	6593900

Land Size

Land Type	Rating, Soil ID - or - Actual Frontage	Acreage - or - Effective Frontage	Square Feet - or - Effective Depth	Influence Factor
74 Commercial V			186872.00	

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4. Other pages in the tax accessor's file for this property reference Union High School District 402 as well as "School District 103," including this excerpt dated April 13, 1990:

012706-1-023-0003 04/13/90 L900659

UNION HIGH SCHOOL DIST 402

L/C 0530 SCHOOL DISTRICT 103

SEC 01 TWP 27 RGE 06
S1/2 SE1/4 SW1/4 NE1/4 LESS W
30FT FOR ST PER AF 9001110281 V 2299
P 941

A "SITE SKETCH" of the campus shows school buildings built in 1950, 1963, 1965, and 1968. The site sketch is shown on the following page. The configuration of the school buildings at the campus appears the same today:

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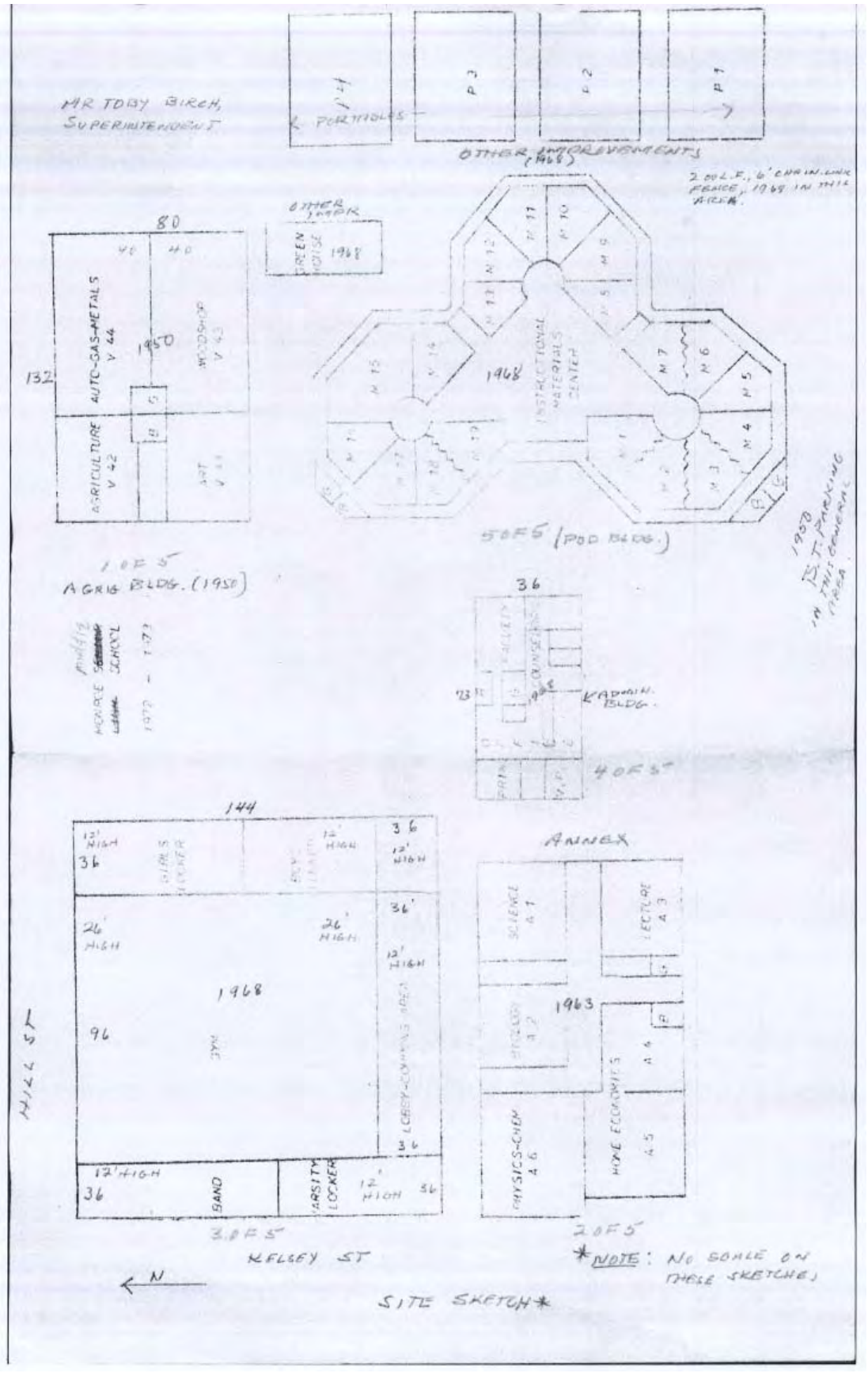

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5. This school campus is located in Monroe, Washington, within the inspection jurisdiction of the Snohomish Health District.

6. According to its own statements, "[t]he Snohomish Health District inspects all schools (public and private) in order to verify compliance with minimal environmental standards for education facilities, as per WAC 246-366-040." Health District "inspectors may check lighting, ventilation, and safety equipment." The enforcement requirements are stated in Health District letters and Washington law. RCW 43.20.050(5).

7. The facts of the following inspections—and the lack of annual inspections in recent decades—is based on Snohomish Health District's responses to Public Records Act requests.

8. From the late 1950s through 1990, the Snohomish Health District conducted inspections of these school buildings on a roughly annual basis. During this time, inspectors regularly cited Monroe School District for violating requirements for minimum lighting intensities for these school buildings. Despite these citations, apparently no penalties or enforcement actions were taken.

9. For example, a Snohomish Health District school inspection report, dated 1973, recorded code violations for ventilation, lighting, and safety for these school buildings. The inspector wrote, "Lighting is substandard in a number of places in this building as has been reported every year since the school was built." Oct. 15, 1973 School Inspection report by Snohomish Health District, to Monroe #103, Monroe High School (Bates stamped 000054) (emphasis in original).

10. Lighting continued to be substandard in subsequent decades. This is significant because, years later, the same substandard lighting fixtures in these school buildings exposed the Plaintiffs to PCBs and other toxic chemicals.

11. Around 1977, the usage of the school buildings changed from the High School program to the Monroe Junior High.

12. Although Monroe Public Schools corrected some safety standard violations over the years, other safety standard violations in the school buildings persisted. For

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example, a letter dated 1980 from the Health District to Monroe School District reported complaints related to ventilation, sanitation and environmental conditions, and noted that, "with little exception, these problems have been noted on our inspection reports for the past several years. Because of the possible health and safety impact upon your students and staff, we feel it is important that substantial changes be made." June 13, 1980 Snohomish Health District letter to Monroe School District (Bates stamped 000080-81).

13. The 1981 Health District inspection report for these school buildings cited deficiencies in areas related to ventilation and lighting, stating "lighting is poor in classrooms and restrooms in the pods [classrooms]." 1981 Health District inspection report to Monroe School District (Bates stamped 000105-08).

14. The 1982, 1984, and 1985 inspection reports noted similar deficiencies. For example, the 1984 report stated, "As we have pointed out for several years now, pod classroom lighting is poor." 1984 Health District inspection report to Monroe School District (Bates stamped 000118-24).

15. Around 1987, the usage of the school buildings changed from being the Monroe Junior High to the Monroe Middle School.

16. In the 1990s, the Health District only conducted safety inspections in 1990 and 1996. (In 1999, there was a complaint investigation report—not an inspection report—regarding poor kitchen ventilation.) There were no Health District inspections of the school buildings in 1991, 1992, 1993, 1994, or 1995. In the 1996 inspection report, the Health District again cited Monroe School District for ventilation and lighting code violations in these school buildings.

17. The Health District did not conduct a regular inspection of these school buildings in 1997, 1998, 1999, 2000, 2001, 2002, 2003, or 2004.

18. By the year 2000, Monroe Public Schools had actual knowledge that its school buildings built before 1980 may contain PCB-light ballasts. The Monroe School District—through a policy apparently promulgated by a State agency—established a "LIGHTING AND BALLAST DISPOSAL PROCEDURES" policy. It required

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inspection of all light ballasts during the summer of 2000. *See* ¶ 3. PCB-light ballasts must then be marked for identification. *Id.* Then "**All ballasts that are assumed to contain PCBs must be disposed of as hazardous waste.**" *Id.* at ¶ 4 (emphasis added).

19. The State, the Health District, Monroe School District, and Union High all should have ensured the removal and remediation of PCBs and other toxic chemicals from the school buildings. The public entity Defendants were negligent in not doing so, which was a proximate cause of Plaintiffs' damages.

20. The Health District should have enforced the minimum environmental safety standards relating to lighting intensities. If the Health District had done so since 1980, the new light fixtures would have been PCB-free. The Health District's lack of action, particularly in light of its actual knowledge of decades of safety code violations, was negligent and a proximate cause of Plaintiffs' damages.

21. The 2003 "Health and Safety Guide" by the State Department of Health and Superintendent of Public Instruction specifically recognized the existence of PCBs in school buildings:

I. LIGHTING

		Required Recommended		WAC or Other Code Reference	Plans Review
I 010 S ☐ U ☐	Inspect all fluorescent light ballasts for PCB content, being certain to wear rubber gloves and goggles. Identify PCB ballasts for future replacement. Almost all fluorescent light fixtures made before July 1979 contain small amounts of highly concentrated PCB's in their ballasts, that can leak PCB contaminated oil. See website: www.epa.gov/pcb	x		EPA	
I 011 S ☐ U ☐	Clean all PCB leakage, including any oil-like film, and replace all leaking ballasts. Dispose of leaking ballasts and cleaning materials in accord with EPA and DOE regulations. Wearing gloves and goggles is important for personal protection as PCB's are absorbed through the skin. Call 1-800-424-4372 or see website: www.epa.gov/r10earth/pcb.htm		x	40 CFR Part 761	
I 012 S ☐ U ☐	Under the Federal Toxic Substances Control Act, a leaking ballast containing PCB's must be packaged in a container approved for PCB disposal, marked "contains PCBs" and have an accompanying manifest. It must be shipped by an authorized PCB transporter to a licensed PCB disposal facility. See web: www.epa.gov/r10earth/pcb.htm		x	TSCA 40 CFR Part 761	

Office of Superintendent of Public Instruction and Department of Health. OSPI-DOH School Health and Safety Guide, January 2003, p. 26.

22. The State's failure to require the removal of PCBs from the school buildings was negligent and a proximate cause of Plaintiffs' damages.

23. The negligence of the public entity Defendants allowed PCBs to remain in

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the school buildings, which was a proximate cause of PCBs remaining in the old Monroe Middle School, later known as Sky Valley Education Center, which contaminated the indoor air and subsequently poisoned children and adults, including the Plaintiffs.

24. It may be that the State, its departments, its employees, or other public entity Defendants, were not fully aware of the dangers of PCBs due to a lack of warnings from Monsanto. Monsanto's statements regarding PCBs have historically and consistently minimized the risk of PCBs to human health. Such statements may have deceived, misled, or lulled the State or other public entity Defendants into inaction regarding the removal of PCBs from school buildings.

25. The 2003 State policy also required minimum light intensities in school buildings. Here is excerpt from that policy requiring minimum lighting:

I. LIGHTING

		Recommended	Required	WAC or Other Code Reference	Plans Review
I 001 S ☐ U ☐	Minimum light intensity of 10 foot candles, from general, task, or natural lighting shall be provided in non-instructional areas including auditoriums, lunchrooms, assembly areas, toilet and store rooms, corridors, and stairs.		x	246-366-120(1)	x
I 002 S ☐ U ☐	Minimum light intensity of 20 foot candles, from general, task, or natural lighting shall be provided in gymnasiums including main and auxiliary spaces, and shower and locker rooms.		x	246-366-120(1)	x
I 003 S ☐ U ☐	Minimum light intensity of 30 foot candles, from general, task, or natural lighting shall be provided in kitchen areas including food storage and preparation rooms.		x	246-366-120(1)	x
I 004 S ☐ U ☐	Minimum light intensity of 30 foot candles, from general, task, or natural lighting shall be provided in instructional areas including study halls, lecture rooms, and libraries. In rooms with computers, or during audio-visual presentations, lighting may be reduced.		x	246-366-120(1)	x
I 005 S ☐ U ☐	Minimum light intensity of 50 foot candles, from general, task or natural lighting shall be provided in special instructional areas including sewing rooms, laboratories (including chemical storage areas), CTE (voc-ed) trade, industrial shops, drafting rooms, and visual & performing arts rooms.		x	246-366-120(1)	x

26. As stated above, if these minimum lighting requirements had been enforced by the Health District, Union High, Monroe Public Schools, or the State at any time since 1980, Monroe School District would have uninstalled the PCB-light ballasts at the school buildings and installed code compliant, non-PCB light ballasts. This would have

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prevented or minimized much of the PCB contamination and subsequent PCB poisoning of the Plaintiffs. Because the public entity Defendants did not do this, however, the Plaintiffs were exposed to PCB contamination. The public entity Defendants' negligence was a proximate cause of Plaintiffs' damages.

27. The State and other public entity Defendants knew or should have known that the existence of PCBs in school buildings poses a danger to children and adults. The potential ignorance of the State, though negligent, is reflected in the absence of PCB discussion in the State's School Indoor Air Quality Best Management Practices Manual (Nov. 2003), available at https://www.doh.wa.gov/CommunityandEnvironment/Schools/EnvironmentalHealth (last visited November 15, 2017). Presumably, adequate warnings or instructions by Monsanto should have rectified or ameliorated the negligence of the public entity Defendants and prevented some or all of Plaintiffs' damages.

28. In the 2000s, the Health District only conducted safety inspections of these school buildings in 2005, 2007, and 2009.

29. In the 2005 inspection letter and report, the Health District stated, as usual, that its "inspectors may check lighting, ventilation, and safety equipment" to "verify compliance with minimal environmental standards for educational facilities, as per WAC 246-366-040." The Health District cited Monroe School District for ventilation and lighting standard violations, but again failed to enforce compliance. 2005 Health District letter and inspection report to Monroe School District (Bates stamped 000146-51).

30. For CO2 concentration limits, ASHRAE Standard 62-2001 recommends no more than 700 ppm above the outdoor concentration as the upper limit for occupied classrooms, which is usually around 1,000 ppm. Carbon dioxide is an asphyxiate that, when measured, serves as a proxy for the quality of ventilation in occupied classrooms.

31. The 2005 inspection report was the first Health District report to measure and record carbon dioxide air quality violations at the school buildings. The report recorded 25 readings in 25 separate classrooms at these school buildings that exceeded

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1,000 ppm of carbon dioxide. Six readings were above 1,500 ppm. Four readings were above 2,000 ppm. Two readings were above 3,000 ppm. *Id.* at 149.

32. As in past years, however, the Health District did not enforce compliance with the minimal environmental standards for the school buildings.

33. In 2005, the State published its familiarity with poor indoor air quality and how it affects children. The State compared sensitive or vulnerable individuals like children to "canaries in the coal mine." The introduction is reprinted here:

Background

Students and school staff deserve and expect a healthy and comfortable environment in which to learn and teach. Similarly, parents expect schools to provide a healthy environment conducive to student learning and one that does not promote or exacerbate illnesses in their children. Within the school environment, reduced indoor air quality (IAQ) due to a lack of fresh air, chemical and biological contaminants, temperature, and humidity has resulted in student and staff health concerns. These concerns may be expressed as complaints of: headaches, rashes, tiredness, respiratory or eye irritation; and may result from single or multiple factors. Since individuals respond to stressors differently, it's likely that individuals that respond initially may be more sensitive than others and are in essence like the "canary in the coal mine," providing an early indication of poor or reduced IAQ. Therefore, it is important that all concerns be taken seriously and investigated thoroughly. An open and proactive response to an expressed IAQ concern can prevent a minor situation from becoming a major problem.

Considerable evidence exists supporting a relationship between poor IAQ and student learning and illness. Children spend between 80 and 85 percent of their time indoors, which includes about seven hours per day in school. Poor indoor air quality in schools is associated with increased student absenteeism and reduced student academic performance. As an example, a recent study involving Washington and Idaho schools found that classroom carbon dioxide (CO_2) concentrations greater than 1000 ppm, due to inadequate fresh make-up air, were associated with a 10 to 20 percent increase in student absenteeism. During the 1990s, the incidence of asthma in young children rose by nearly 60 percent and was responsible for ten million missed school days per year nationwide. In the mid 1990s, one in five schools across the United States, representing 8.4 million students, was identified as having IAQ problems. Furthermore, maintenance and operations budgets have declined as a percentage of school operating budgets from nearly 12 percent in 1990 to nine percent in 2000, which may contribute to poor indoor air quality in both new and aging school buildings.

Washington State has 296 school districts with more than 2,200 buildings and over one million students. While the total number of IAQ concerns reported in Washington State schools is unknown, several school districts have experienced severe IAQ events that have resulted in temporary school closures. Discussions with officials from these districts highlight the need for a clear and systematic approach that enables school administrators to quickly and effectively investigate and resolve IAQ concerns.

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Wash. State Department of Health, Office of Environmental Health & Safety. Responding to Indoor Air Quality Concerns in our Schools. June 2005, p. 5, available at https://www.doh.wa.gov/CommunityandEnvironment/Schools/EnvironmentalHealth (last visited November 15, 2017).

34. Despite this knowledge, the State did not supervise the removal of toxic and hazardous substances such as PCBs from the school buildings. This was negligent and a proximate cause of Plaintiffs' damages.

35. In 2006, the Health District did not conduct an inspection of these school buildings.

36. In 2007, the Health District inspected the school buildings and noted "there were several items noted during this safety inspection that appear **not to have been addressed** since the last inspection conducted in 2005." 2007 Health District letter and inspection report to Monroe Public Schools (Bates stamped 000153-59) (emphasis added). This included ventilation violations as well as more than a dozen CO2 measurements in different classrooms that exceeded 1,000 ppm, with five measurements that exceeded 1,500 ppm. *Id.* at 154, 156-57. The Health District also cited Monroe School District for violating minimum light intensity standards in the Music rooms, the Library, and a half-dozen classrooms. *Id.* at 153, 155.

37. In 2007, the Health District did not enforce compliance with the minimal environmental standards for the school buildings.

38. In 2007, the School District received its State Study and Survey by an architecture firm, Hutteball & Oremus, regarding the District's public educational facilities. The study reported to the School District that the school buildings, then known as the Monroe Middle School, have safety issues. The Monroe Middle School "is deteriorating at a rate which exceeds that of normal maintenance efforts and funding." 2007 Hutteball & Oremus State Study and Survey for Monroe School District, p. 219. "The level of deterioration at this facility is the most severe of any school within the District." *Id.* at Executive Summary. The study recommended demolishing the existing

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classrooms and library. *Id.* at 19. "None of the existing HVAC equipment is in compliance with current codes." *Id.* at 69. The study reported that the lighting was deficient, and recommended that the lighting system be upgraded and replaced throughout the facility. *Id.* at 70, 18. Hazardous material existed in the school buildings: "The campus is reported to contain friable asbestos containing material such as pipe insulation and non-friable vinyl asbestos floor tile. The Classroom/Library building contains insulated asbestos panels at the window areas." *Id.* at 11. The study did not mention PCBs, but recommended a hazardous material survey by an independent consultant in conjunction with planning of future modernization, additions, or replacements. *Id.* The study stated that "the Monroe Middle School is in need of immediate renovation and upgrades… **Existing life safety issues, energy inefficiencies, and code issues will continue to exist until significant action is taken to correct these deficiencies**." *Id.* at Summary, 25 (emphasis added).

39. The Monroe School District did not follow these recommendations in 2007, but instead continued to use the school buildings in their condition for several more years.

40. In 2008, the Health District did not conduct an inspection of these school buildings.

41. In 2009, the Health District inspected the school buildings and noted "there were several items noted during this safety inspection that appear **not to have been addressed** since the last inspection conducted in 2007." 2009 Health District letter and inspection report to Monroe School District (Bates stamped 000254-62) (emphasis added). The repeated violations included safety standards relating to ventilation, lighting, and air quality, including roughly a dozen rooms where CO2 levels exceeded 1,000 ppm. *Id.* at 254-61.

42. Again, the Health District did not enforce compliance with the minimal environmental safety requirements for these school buildings.

43. In 2010, the Health District did not conduct an inspection of these school

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buildings. The Health District also did not enforce compliance.

44. In May of 2011, the Health District inspected the school buildings and noted "there were several items noted during this safety inspection that appear **not to have been addressed** since the last inspection conducted in 2009." 2011 Health District letter and inspection report to Monroe School District (Bates stamped 000270) (emphasis added). Repeated violations included safety standards relating to ventilation and lighting. *Id.* at 266-70. This report did not measure and record CO2 levels.

45. But the Health District did not enforce compliance with the minimal environmental safety requirements for these school buildings.

46. If the Health District or the State had enforced compliance with minimum lighting safety requirements in 2011, then Monroe School District (or Union High) would have uninstalled the toxic PCB-light ballasts at the school buildings and installed code compliant, non-PCB light ballasts. This would have reduced the PCB contamination and subsequent PCB poisoning of the Plaintiffs. But the Health District and the State did not enforce compliance. That was negligent and a proximate cause of Plaintiffs' damages.

47. Following the spring of 2011, the Monroe School District removed the middle school program from the school buildings.

48. The School District chose to move an education program called Sky Valley Education Center into the school buildings.

49. Sky Valley Education Center was and is an alternative kindergarten through twelfth grade education program. Often, parents spent time with their children in the classrooms. Many mothers were also pregnant or had infants with them at school.

50. The program was formerly situated in a warehouse space in Monroe. The use of the warehouse space cost the Monroe School District several hundred thousand dollars per year in rent. To avoid paying that money, the School District chose to break its lease with the warehouse landlord, sue the landlord, and move the Sky Valley program into the old Monroe Middle School. The litigation led to a 2013 settlement in which the School District paid $900,000 to parties related to the interests of the warehouse landlord.

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51. In the summer of 2011, the Monroe School District did not conduct a hazardous material survey of the old Monroe Middle School. The School District also did not fund any hazardous material abatement or renovation work of the school buildings.

52. Instead, the Monroe School District, or the administrators for the Sky Valley Education Program, invited Sky Valley program teachers, parents, and children to volunteer to clean the old Monroe Middle School. As a result, Sky Valley program teachers, parents, and children worked during the summer to remove some old carpets, paint some walls, and clean classrooms. This was the first exposure that these individuals, including some of the Plaintiffs, had to the toxic contamination at these school buildings.

53. The Monroe School District administered the Sky Valley Education program at this location, starting in September of 2011.

54. In the 2010s, the Health District only conducted safety inspections of these school buildings in 2011, 2013, and 2016.

55. In December of 2011, the Health District inspected Sky Valley Education Center, now occupying the site of the old Monroe Middle School buildings. As in past years, the Health District cited the Monroe School District for violations of primary and secondary school safety requirements, WAC 246-366. Jan. 2011 Health District letter and report to the Monroe School District (Bates stamped 000273-79). The Health District cited the School District for violations of ventilation and lighting intensity requirements.

56. In 2011, the Health District did not enforce compliance with minimal environmental safety requirements for these school buildings.

57. In 2012, the Health District did not conduct an inspection of these school buildings. The Health District also did not enforce compliance.

58. In 2013, the Health District inspected Sky Valley Education Center. As in past years, the Health District cited the School District for violations of primary and secondary school safety requirements, WAC 246-366, including lighting intensity and ventilation requirements. 2013 Health District letter and report to the School District (Bates stamped 000283-87). The carbon dioxide levels in four classrooms was measured

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and exceeded 1,000 ppm. *Id.* at 283.

59. In 2013, the Health District did not enforce compliance with minimal environmental requirements for these school buildings.

60. In 2014, the Health District did not conduct an inspection of these school buildings. The Health District also did not enforce compliance.

61. From 2011 through 2016, the school buildings continued to have PCB-caulking and PCB-light ballasts, some of which failed over time and leaked PCBs and pyrolyzed PCB byproducts such as dioxins and furans into the indoor air of the school buildings.

62. It is unknown exactly how many PCB-light ballasts failed, fumed, leaked, or smoked PCBs or PCB byproducts into the Sky Valley classrooms between 2011 and 2016. According to a 2014 School District memorandum, however, by that time it appears that more than 100 light ballasts had failed, resulting in "Fixtures requiring maintenance cleaning." *See* MSDG_014266.

63. From 2011 through 2016, the Monroe School District does not appear to have conducted any environmental testing regarding the various levels of PCBs, dioxins, or furans in the school buildings during PCB-light ballast failure events or in their immediate aftermath.

64. Students and teachers witnessed different PCB-light ballast failures in different classrooms. The failing PCB-light ballasts burned, fumed, or smoked vapors into the classrooms. Some failing PCB-light ballasts also dripped PCB fluids onto the desks and carpets. The Monroe School District's solution for one such PCB leak was to put a bucket under the leaking ballast, which collected a puddle of PCB fluid. This open collection of PCB fluids was done while children used the classroom. The bucket was left in place for several days. The PCB-stained carpet was left in place even longer.

65. One Sky Valley teacher recorded some PCB-light ballast failures and probable failures during this time period. For example, in April 2014 a "ballast in Nona's room caught fire and we could smell the smoke in rooms A, C and D and the hallways."

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Another ballast failed and created "a bad smell" the following week. Some teachers began researching the issue, inspecting overhead lights in the rooms, and reporting their concerns to the Monroe School District. Here is one photo (taken by a teacher during that time) of stained light fixture housing, along with the teacher's notes:

ballast plates with dried black/brown residue assumed to be previous ballast oil leaks. I remember that there at least two (first ballast on left as enter the room from the hallway and one near the back of the room on the window side) and maybe three lighting plates with brown residue that I assumed was oil from ballast (See Figure 1). We also looked at the fixture in room A that had leaked in 2010 and found that it also had brown residue.

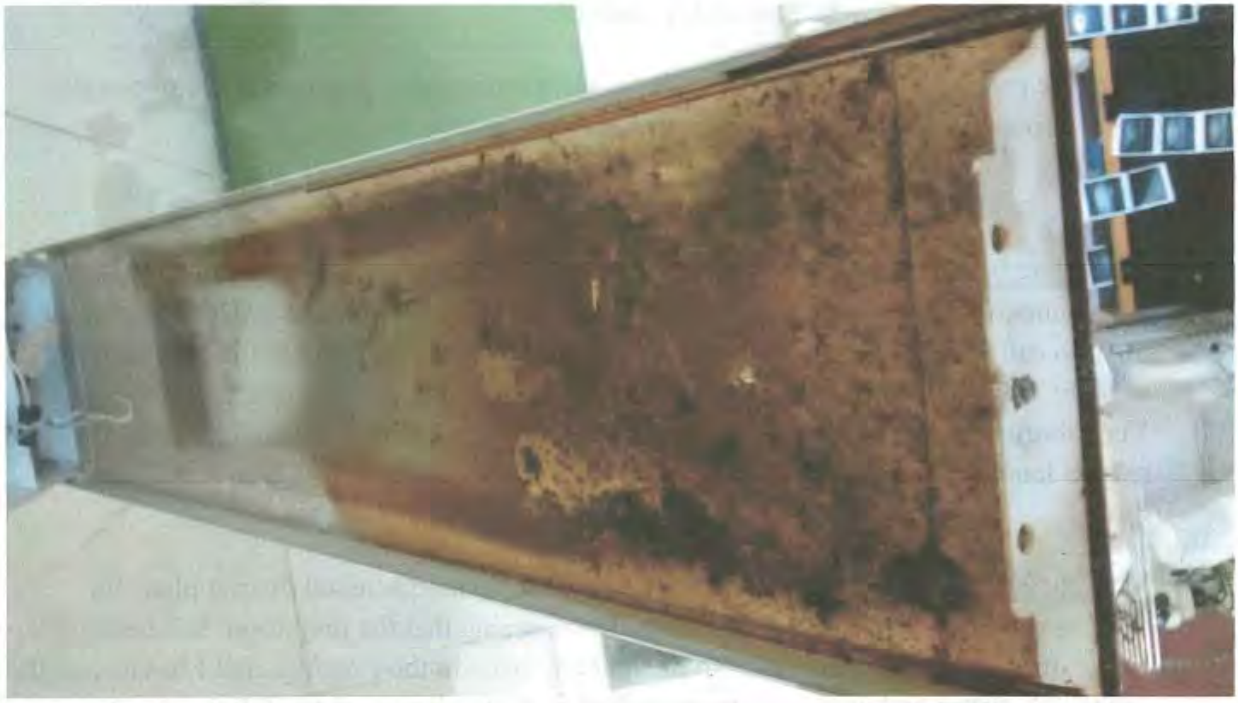

Figure 1: Ballast leak in Room C (Note: photo taken April 2014, tray replaced May 2016)

66. In response to other light ballast failures, the Monroe School District maintenance department staff often put the stained light fixture housing materials (along with cleaning rags) in hallways or leaning against classroom walls. Some such housing materials were left in common areas for weeks.

67. In 2014, at least three Sky Valley teachers submitted indoor air quality reports for classrooms, reporting symptoms of acute headaches, sinus issues, burning eyes, "pressure" in the head," sneezing, and neck pain. Nov. 14, 2014 SVEC Preliminary

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Indoor Air Quality Assessment, East Pod, by EHSI, p. 2.

68. The Monroe School District knew that the Sky Valley Education Center classrooms and common areas contained PCB-light ballasts. The Monroe School District also knew that the PCB-ballasts would fail and make "a very nasty smell filling a classroom." The Sky Valley principal acknowledged this to the Sky Valley staff, although the principal assured staff that the building is "safe." Here is part of the Sky Valley principal's message to the staff in April of 2014:

Hi SVEC Staff,

I wanted to let you know about a challenge we are having with the lighting in our school and make sure you are aware how to get your lighting fixed should you have an issue. Please know that we are complying with Risk Management policies and procedures regarding these light fixtures; and as you all know, Risk Management takes its job of protecting staff and students very, very seriously!

I have met with the Maintenance and Facilities Director, Ralph Yingling, consulted with the Assistant Superintendent of Operations, John Mannix (who among other things is in charge of Facilities and Risk Management) and talked with our custodians Dean and Tim to review our procedures to ensure safety.

Some of the lighting ballasts in our building (as with several other schools in the district and many schools nationwide) are quite old and contain material with PCBs. This material requires special care. At this time, there are some of these old ballasts in many of our classrooms and common areas. As these ballasts go out, we are replacing them with new ballasts that do not contain PCBs.

In the meantime, we want you to be sure to follow the procedure below to prevent any issues from happening in your classroom. The issues we have experienced are a very nasty smell filling a classroom and the large bulbs getting extremely hot then producing a gooey substance around the lighting in the fixture. Do not attempt to mess with or fix the light on your own. That job must be done by one of our custodians who knows what equipment to use, how to take care of the problem safely, and how to dispose of the materials properly.

…

the number one priority of a school district. Our building is quirky and old and sometimes a challenge. But it is ours. And it is safe.

Karen

69. The Sky Valley principal also told parents that they should not complain about the condition of the school buildings or else they could lose their program. Instead, the principal said that parents should be grateful to have the campus.

70. In response to complaints in 2014 by some teachers, however, the Monroe School District maintenance department conducted some inspections and drew some maps of the school building ceilings and light fixtures. Some maps are attached to this

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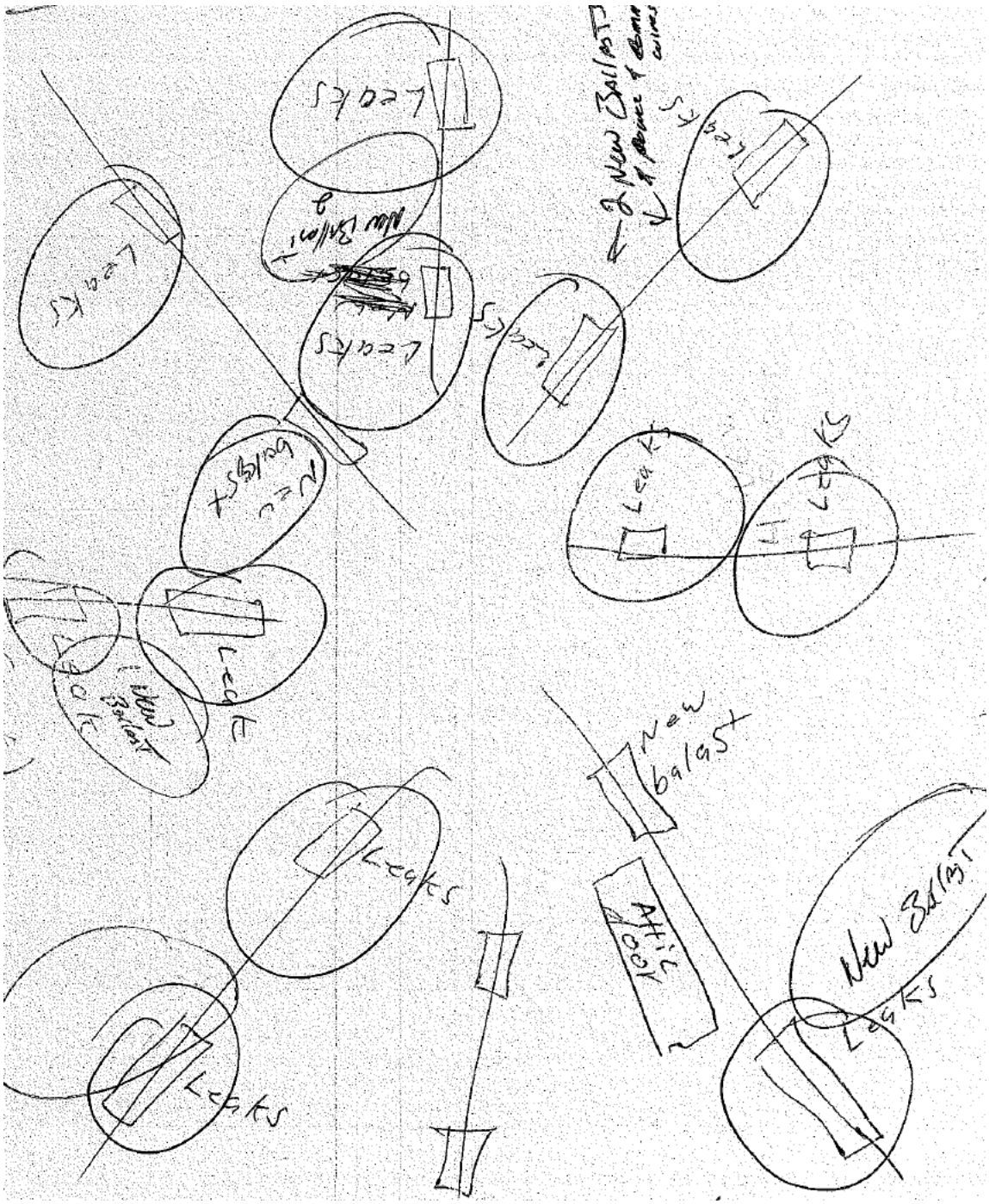
complaint as **Exhibit T**. Different areas of the school buildings are depicted as showing PCB-light ballast leaks. Here is a portion of one of the maps (a later draft version of MSDG_014453), looking up at the ceiling of the south pod:



71. In October of 2014, the Monroe School District director of facilities and operations recorded carbon dioxide levels of 1,700 ppm in one classroom. *EHSI 2014*

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Report. In November of 2014, roughly ten measurements of classroom areas showed CO2 above 1,000 ppm. *Id.* at 7. An independent contractor, EHS-International, Inc., concluded that "there is not a mold problem in the classrooms assessed," and stated that "the reported symptoms which include headaches, sinus issues and sneezing are more likely related to under-ventilation of the spaces as indicated by indoor carbon dioxide concentrations that exceed 1,000 parts per million (ppm) during classroom sessions." *Id.* at 1. Although "carbon dioxide is considered a surrogate for other airborne contaminants," neither the School District nor EHSI appear to have measured the concentrations of PCBs or other toxins in the classrooms at this time. *Id.* at 12.

72. By 2014, if not earlier, the State (through its Department of Health) had actual knowledge of PCB-light ballast failures and PCB contamination at the Sky Valley school buildings. The State also knew that even apparently intact and non-leaking PCB-light ballasts can release PCBs into the air. (See below.) Despite this knowledge, the State took no action to prevent toxic exposure and protect the children and adults who used those school buildings.

73. In response to one student's complaints of headaches, the Health District conducted a field investigation and found that classroom "airflow was low (CO2 high)." Jan. 2015 Health District Field Investigation Report (Bates No. 000289).

74. Apart from that field investigation, the Health District conducted no regular, comprehensive inspection of the school buildings in 2015.

75. Despite the Health District's lack of inspections in the fall of 2015, the Health District had actual knowledge that Sky Valley teachers reported being sickened by the school buildings.

76. In the fall of 2015, one Sky Valley teacher was taken away from the school buildings by ambulance due to neurological symptoms. She later resigned due to illnesses she attributed to the school buildings. The substitute teacher who took her place began having neurological symptoms in the weeks that followed, including a seizure, until he also resigned within three months of assuming the post. Many other teachers developed

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diseases like thyroid disorders, Hashimoto's Disease, and cancers. Roughly a dozen, if not more, teachers resigned from working in these school buildings. Later, roughly a dozen teachers also filed a union grievance against the Monroe School District for the toxic contamination in the school buildings. Children and parents in these classrooms also developed concerning symptoms and diseases, as outlined below.

77. Because the cafeteria "gathering area" was too small to accommodate everyone for mealtimes, children and adults regularly ate lunches and snacks in their classrooms.

78. By the end of 2015, if not earlier, the Health District had actual knowledge that the school buildings contained PCB spills and PCB-containing materials.

79. Despite this knowledge, and upon request by the School District, in 2015 the Health District canceled the regular inspection of the school buildings. The Health District canceled the inspection scheduled for September of 2015, and instead rescheduled it to December of 2015. Upon request by the School District, however, the Health District also canceled the inspection scheduled for December of 2015. The Health District delayed the inspection until January of 2016.

80. As in 2014 and previous years, the Health District did not enforce compliance with the minimum environmental safety requirements for these buildings in 2015.

81. During 2015 and 2016, the Health District received and compiled complaints about illnesses associated with the buildings.

82. But Health District staff told complaining Sky Valley families and teachers that the Health District would not take any enforcement action against the School District unless eventually many people became sick.

83. Between March of 2013 and January of 2016, the Health District conducted no regular inspection and issued no regular inspection report to the Monroe School District regarding these school buildings.

84. In December of 2015 and January of 2016, the Monroe School District

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contracted with environmental engineers to conduct indoor air quality samples, which were then analyzed in a laboratory for PCB content. Some air samples were taken while classes were in session. Apparently unbeknownst to the environmental engineers, this air quality sampling of indoor classroom air was done with exterior windows and doors wide open, rendering the results invalid. During the testing, teachers and students wore their winter coats in the classrooms. Other air samples were apparently taken over the holiday break when classroom air temperatures were low. One State (Department of Health) official emailed other officials, questioning the validity of these results:

> I do not know the purpose of the PCB testing--is it to address this cluster of exposed students/concerned parents, or to address the ballast that smoked in August, or for another reason? I do agree with Nancy that the air test results are not representative of school exposures if the school temperature was low on the day of the testing. From the EPA info I've read, temperature should be taken into consideration when conducting air tests due to the volatility of PCBs. I also find it odd that the LOD for this set of samples of <200 ng/m3, is 5x higher that the LOD for the May 2014 report (<40 ng/m3). The author refers to the duration of sampling but that was the same (24 hours). For the above reasons, can't agree with the report conclusions about PCBs in air are less than the EPA guidelines.

See Snohomish Health District Response to Public Record Requests, Bates No. 000379.

85. By December of 2015, the Health District and the State Department of Health received reports that "multiple teachers have adverse health issues including dizziness, nausea and headaches," and that the school buildings contained both live and failed PCB light ballasts, according to a timeline created by Health District investigator Amanda Zych:

> 11/30/15 – Amanda Zych received call from Nancy Bernard, DOH School Program – They received a complaint from a teacher with health issues at the school.
>
> 12/1/15 – Amanda Zych received call from original complainant – Complainant #1. Complainant #1 (teacher) reported that multiple teachers have adverse health issues including dizziness, nausea and headaches. Complainant stated that 4 light ballasts burst (catch on fire and then oil was noted leaking out of the fixture) in Spring – 2014. Complainant #1 reported that consultants were hired by the Monroe School District to address. It was reported that another bulb burst and leak this Fall – August 2015 - after the consultants completed their work. Complainant #1 also alleged that the PCB light fixture that burst in August 2015 had oil that leaked onto the carpet in Room D and the School District covered the oil stain with duct tape.

See Snohomish Health District Response to Public Record Requests, Bates No. 000468.

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86. By this time, if not earlier, the Health District was aware of reports of sickened children ("endocrine or hormonal issues") in addition to the "multiple teachers with adverse health issues," according to inspector Zych's chronology:

> 1/8/16 – Amanda Zych received call from Complainant #2 – 5 children in the school, parent. All 5 children are sick with endocrine or hormonal issues. All 5 are in the Montessori pod. Forwarded her to the Pediatric Environmental Health Specialty Unit (PEHSU).

See Snohomish Health District Response to Public Record Requests, Bates No. 000467.

87. Meanwhile, the Health District received report of multiple teachers who were "out on medical leave":

> 1/20/16 – Amanda Zych received call from Complainant #3 - parent has children at the school. Worried because multiple teachers are out on medical leave. Wondering if the school is safe. Knows about PCB ballasts. Forwarded her to PEHSU.

Id.

88. Despite this knowledge, no public entity Defendant conducted a health impact assessment on the Sky Valley population. Instead, the public entity Defendants kept the school buildings open and in use.

89. In January of 2016, the Health District conducted an inspection and issued a report to the Monroe School District. As in previous years, the Health District cited the School District for numerous violations of WAC 246-366, including roughly twenty violations of minimum lighting intensity safety requirements as well as violations of ventilation standards.

90. The Health District report to the School District did not mention PCBs, PCB spills, or the sicknesses of Sky Valley teachers, parents, and children.

91. Meanwhile, the public entity Defendants learned that, in addition to the PCB contamination, the school buildings were contaminated with metals (including lead) in the school drinking water, radon in the indoor air, disturbed asbestos fibers, and molds, including black mold.

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92. By March, Health District inspector Zych noted a report that people had been ill from the school buildings for years, back when the campus was the Monroe Middle School. Separately, the *Everett Herald* newspaper published the fact that the School District "received eight complaints about illnesses potentially linked to air quality from 2001 to 2015." *See* Snohomish Health District Response to Public Record Requests at Bates No. 000465. The March complainant to the Health District reported that "70 people are known to be ill from Sky Valley. More don't want to be added to the list for fear of repercussions… People are very scared to report symptoms and join group." *Id*. at Bates No. 000475. This number grew in the coming months.

93. A Monroe School District administrator, John Mannix, dismissed these parental and teacher concerns at a community meeting, stating that "If only 10% of the population ever reacted to the environment, that would be normal." *See* Snohomish Health District Response to Public Record Requests, Bates No. 000474. Mannix also reportedly stated that the reported illnesses could not be caused by the disturbed asbestos fibers in the school buildings, because lung diseases caused by asbestos fiber exposure do not appear until decades after exposure.

94. Meanwhile, Health District inspector Zych reported to her colleagues regarding a dozen known cases of Sky Valley children experiencing "precocious puberty," which is a pathological early-onset of puberty caused by hormonal or endocrine disruptions. *Id.* at Bates No. 000585.

95. By April, Health District inspector Zych updated her chronology to reflect additional information, including notes on an environmental report on the buildings:

> 4/21/16 – Update. Continue to receive calls from numerous complainants. Printing out emails and adding additional service records to the file. Received a copy of the PBS Environmental report on 4/18/16. The report states that PCB levels were above the Rfd in 7 areas of the school. The report states that PCB-containing paint was noted on some interior walls in the school. The report states that some caulk used exterior and interior was noted to contain levels of PCBS.

Id. at 000592.

96. Health District inspector Zych created a spreadsheet of some symptoms and

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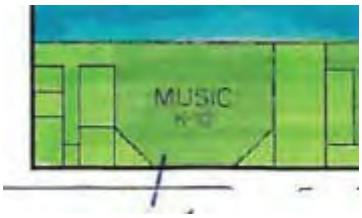
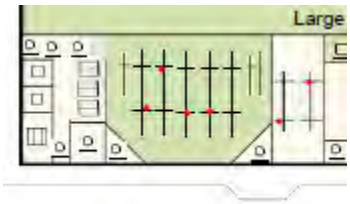
diseases of 63 Sky Valley complainants who had come forward to report adverse medical affects. The Health District spreadsheet is attached as **Exhibit U** (Bates No. 000593-96).

97. Despite this knowledge, the public entity Defendants still kept the school buildings open and in use.

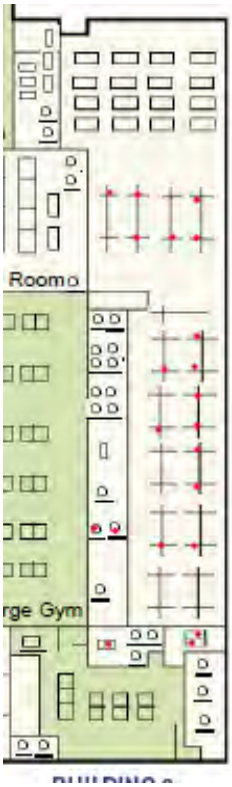
98. The Monroe School District's environmental contractors created a map entitled "PCB Light Fixture Cleaning," in which red dots showed the light fixtures throughout the school buildings. It is attached as **Exhibit V** along with a map showing School District remediation activities in the spring of 2016**.**

99. The school building maps show the room names and the rooms' PCB light fixtures—the **red dots**—that needed cleaning. Here was the Music Room and its red dots:





100. Here was the Gathering Area, where children and adults ate and socialized:



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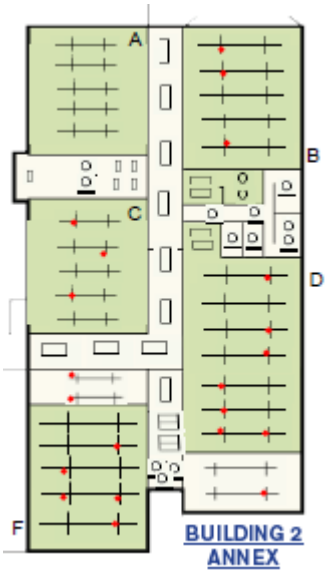
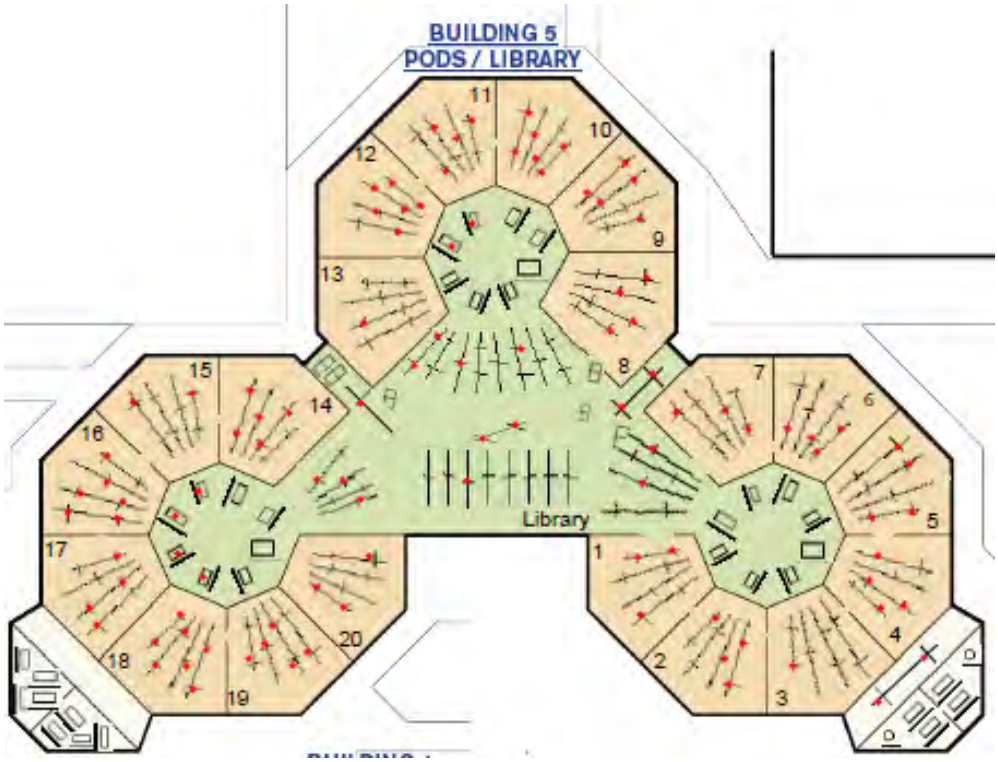
101. Here was Building 2, Annex, which housed classrooms A, B, C, D, and F, marked with the red dots in the classrooms, along with Building 1, the Office:



102. Here were the numerous PCB light fixtures that needed cleaning in Building 5, where the Library and the pod classrooms 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20 were located. Note the frequency of red dots:



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103. By the end of April of 2016, 81 individuals had come forward to report to Health District inspector Zych regarding their diseases and symptoms they associated with Sky Valley Education Center:

From: Amanda Zych
Sent: Friday, April 29, 2016 4:01 PM
To: Kevin Plemel; Jeff Ketchel
Subject: Updated SVEC Complainant Summary

FYI –
Since December 2015, I have recorded 81 individuals that have complained of health effects that they associate with Sky Valley Education Center.

Of these individuals:

- 17 – thyroid issues (including 3 Grave's disease, 5 precocious puberty, 5 Hasimoto's disease and 1 hypothyroid)
- 29 – report fatigue
- 24 – report asthma/cough
- 23 report headache
- 21 report GI issues and nausea
- 17 report cognitive issues – "foggy brain"
- 11 report sore throat
- 7 Burning of lungs
- 9 dizziness, fatigue

Thanks!

Amanda Zych | Environmental Health Specialist | Environmental Health
3020 Rucker Avenue, Ste 104 | Everett, WA 98201 | **425.339.8774** | azych@snohd.org

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See Snohomish Health District Response to Public Record Requests, Bates No. 000633.

104. The Health District sent at least two letters in June to the School District regarding elevated PCB levels, the closure of some classrooms, and required summertime remediation of the buildings. *See* **Exhibits W1** and **W2**. The Health District letters cited WAC 246-366-140, stating "the existence of unsafe conditions which present a potential hazard to occupants of the school are in violation of these regulations." *Id.* By the end of June, the Health District was aware of "over 100 parents, teachers and children [who] have reported illness that they associate with the building." *Id.* at W2.

105. Apart from a closed classroom or two, Sky Valley Education Center remained open through June of 2016.

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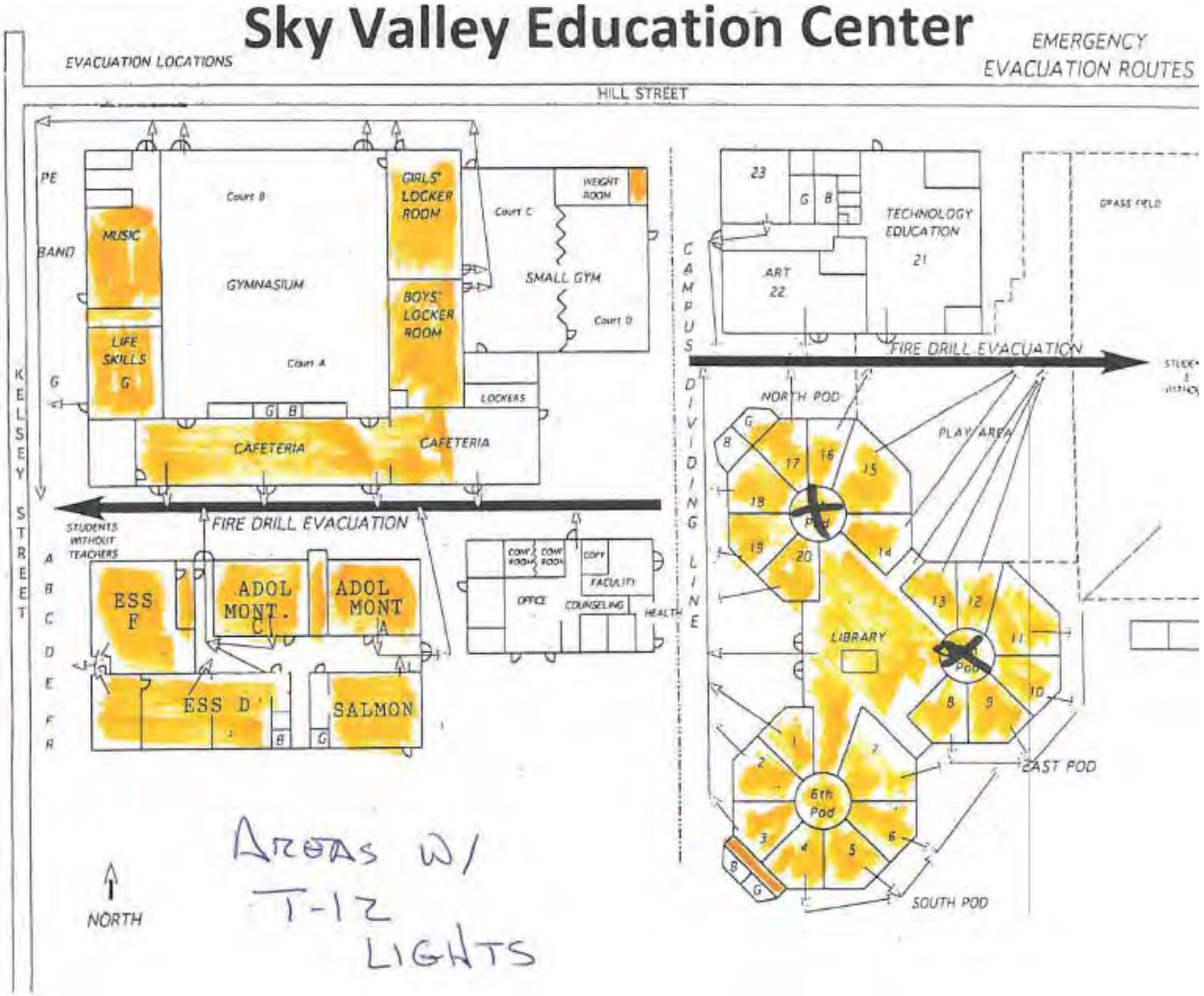
106. Another name for PCB-light ballasts is "**T-12 lights**." The Monroe School District made a map of affected classrooms at the Sky Valley campus:



See Monroe School District's Response to Public Records Requests, Bates No. MSDG_014499.

107. Before the 2016 school year was over, the Monroe School District had disposed of at least 1,648 pounds of PCB-light ballasts:

678 LBS. PCB BALLAST, DRUM # 2769
628 LBS. PCB BALLAST, DRUM # 2770
342 LBS. PCB BALLAST, DRUM # 2771

See MSDG_014240-41 (hazardous waste disposal manifest).

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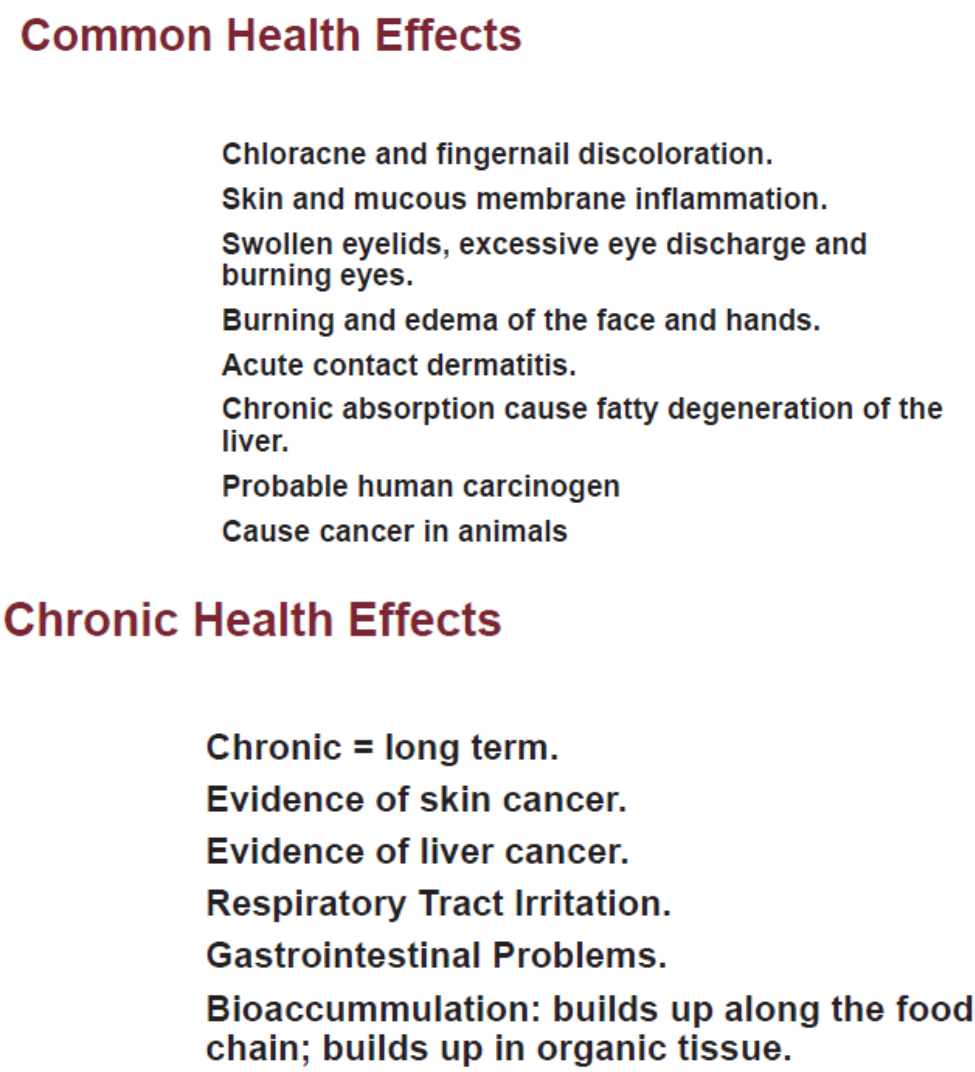
108. Around this same time, the Monroe School District appeared to have possessed a PowerPoint regarding the dangers of PCB-light ballasts. Here are two of the slides:



See MSDG_014128, 014135. As shown earlier in this Complaint, the list of these adverse health effects due to PCB exposure is not complete.

109. The Monroe School District's environmental consultants conducted a litany of air, wipe, and caulking sample tests for PCBs between January and June of 2016. Results varied at different locations and different times within the school buildings, with some results as "none detected," other results characterized as being "low" or "safe" by the public entity Defendants, and with other results recognized as being "high." Many

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wipe samples appear to have been taken *after* deep cleaning. Despite the cleaning efforts, PCB test results in May of 2016 were among the more elevated levels of PCBs detected.

110. By the spring of 2016, some families had unenrolled from Sky Valley due to the adverse medical effects that they associated with the school buildings. Other families stayed enrolled until June of 2016, having been either unaware of the reports and tests of environmental contamination, or having been assured by the Monroe School District that the school buildings were safe.

111. After some remediation in the summer of 2016, the Monroe School District resumed Sky Valley classes in September.

112. Some families attempted to return to Sky Valley in the fall, but unenrolled after re-experiencing adverse medical symptoms that they previously experienced in the school buildings. With the knowledge that the school buildings had been contaminated with toxic chemicals, these families unenrolled. Their spots were then filled by other families on the waitlist for the school program (Sky Valley is a popular program), while the Monroe School District assured the public that the school buildings were safe.

113. The Health District and School District had some knowledge that this was happening, as shown in this fall 2016 email by inspector Zych to school administrators:

From: Amanda Zych
Sent: Friday, September 30, 2016 3:10 PM
To: 'Piplic, Devlin'; Mannix, John
Cc: Kevin Plemel; Jeff Ketchel
Subject: Complaint - SVEC

John and Devlin,

For your awareness, I talked to a parent today on the phone that has concerns about Sky Valley. She stated that her daughter had rashes and her son had nose bleeds last year and were both fine over the summer. She went on to say no that they have been back for 2 weeks, symptoms have reoccurred. She stated that her daughter was in Music and Art on Tuesday and then her hands swelled up and had a red rash or hives on them. She stated that her son was in Robotics #1 , #18 and Art and then had a bad nose bleed last night.

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See Snohomish Health District Response to Public Record Requests, Bates No. 001398; *see also* Bates No. 001820 (Sky Valley parent emailing Zych that "Hope to hear something will change for our kids and families. We do love this program. As so many that cry that they still feel sick when they come near the building so cannot come [*sic*].").

114. Decades of PCB off-gassing, leaks, spills, and fume events, however, caused these school buildings to become secondarily contaminated as large toxic "sinks." That is, porous materials like library books, papers, bricks, and carpets absorbed the PCBs over the years and now release PCBs back into the indoor air. Plaintiffs who have been sensitized to PCB contamination after suffering PCB poisoning still cannot enter or use these school buildings without suffering uncomfortable, painful, or debilitating reactions, despite the School District purportedly uninstalling the primary sources of PCBs (the PCB-caulking and the PCB-light ballasts) by the summer of 2016.

115. Environmental tests during the 2016-2017 school year continued to detect levels of PCBs in the air and classrooms of these school buildings to varying degrees, although many results showed "none detected" at the reporting limits. (There is a limit to the sensitivity of the air sampling and laboratory testing.)

116. As before, at least some environmental tests were conducted with the classroom windows "wide open," as reported to Health District inspector Zych:

3/1/2017 – phone call from Shamus Neary teacher – 360 – [redacted] – Room F

He stated that he was concerned that the levels in the quarterly testing were 42,000 in his room. He stated that he was upset that the district didn't let him know of this sooner. I stated that we just received the information on 2/23/17.

He stated that when he came back from winter break he noticed the air sampling machine in his room and didn't understand why – he thought the testing was completed. He also stated that the window in his room was wide open. He stated he believes that this occurred on January 7th.

See Snohomish Health District Response to Public Record Requests, Bates No. 001517.

117. According to the Health District, "Seven of the rooms that were tested during the PCB air sampling indicated levels in excess of established exposure limits."

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Id. at 001524.

118. The Monroe School District went to the press to claim that such year-2017 PCB results were "false positives." Superintendent Smith made this claim to reporters. She also claimed that any past symptoms reported by members of the Sky Valley Education community were minor and like "colds." This was not true. She knew this statement was not true because parents and teachers had previously reported to her serious illnesses and diseases, including sexual developmental disorders in young children after they began attending classes in the school buildings.

119. The services of the environmental consultant were terminated.

120. Subsequent PCB testing results appeared to be lower (or "none detected") than the pre-remediation testing results.

121. Until last year, when the PCB and other toxic contamination became public, the School District kept the Sky Valley staff, parents, and children in the dark about the actual toxic contamination in the school buildings.

122. Two out of three STEM teachers at the program have reportedly had cancer since 2011. Three young parents of STEM students have died of cancer. Two children have reportedly died of cancer. Other children and adults who spent time in the school buildings have also suffered cancers, endocrine disorders, autoimmune disorders, neurological disorders, and miscarriages.

123. Since the Monroe School District moved the Sky Valley Education program into the old Monroe Middle School in 2011, many but perhaps not all children and adults who spent time in the school buildings developed symptoms. The symptoms varied in their type and intensity. They included eye irritation, vision difficulties, frequent colds and infections, throat irritation, nose bleeds, allergies, asthma, persistent coughs, difficulty breathing, heart palpitations, headaches, tremors, numbness, tingling, confusion, memory loss, concentration difficulties, depression, anxiety, learning problems, dizziness, nausea, vomiting, abdominal pain, gastrointestinal issues, joint pain, thyroid issues, puberty abnormalities, weight issues, weakness, fatigue, chills, night

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sweats, skin rashes or hives or blisters, skin cysts, peeling skin, and other complaints.

124. The frequency and severity of the symptoms appeared to be positively correlated with the vulnerability of the individual and the amount of time spent in the school buildings. The symptoms and diseases worsened over time for these individuals.

125. Symptom severity generally improved during holiday breaks, when the children and adults spent time away from the school buildings.

126. At different times during the past few years, some Sky Valley parents and teachers raised serious health concerns associated with the school buildings to the Monroe School District and the Health District. Until mid-2016, the School District and the Health District did not appear to take the concerns seriously.

127. For example, in 2014 the Monroe School District head of maintenance, Ralph Yingling, told two teachers that they should not be concerned about the PCB-light ballasts. He added that he was in Vietnam and exposed to Agent Orange, and PCB-light ballasts are nothing to worry about in comparison.

128. Administrators for the School District promised some teachers that all PCB-light ballasts would be removed and replaced with safe light fixtures during the summer of 2014. This clearly was not done.

129. Another School District administrator ridiculed parents of "sick children" as not being interested in going to school.

130. The Monroe School District, or its Sky Valley principal, actively discouraged Sky Valley teachers from sharing environmental safety concerns with Sky Valley families.

131. The Monroe School District, or its Sky Valley principal, also actively discouraged parents from filing indoor air quality complaints with the School District.

132. The Sky Valley principal also admonished one teacher for cancelling classes due to her concerns about safety in her classroom.

133. That same teacher developed Hashimoto's Disease (a thyroid disorder) after teaching in that classroom.

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134. Some people who spent time in these school buildings cope with skin issues. Unlike headaches, gastro-intestinal pain, or other internal maladies, skin disorders can be photographed. Here are photographs of children, parents, and teachers showing skin sloughing, blisters, rashes, pigmentation changes, a neurological disorder, and a cyst:

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These photos (above) show blisters and sloughing skin in Sky Valley adults and children.

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Many flares have spread since the fall of 2014, some flares lasting weeks or months. At least four were so painful that they interfered with sleep or required medical attention. This photo shows the start of a flare. In just a week, it got quite a bit worse. First photo was 2/13/15.

Second photo shows the rash spreading onto back of neck on 2/21/15.

3rd photo was 4/11/2015.

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Here are skin pigmentation changes in a Sky Valley adult and a child (above and below):

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Here is chloracne on the back of a Sky Valley parent:

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Sky Valley children and adults also cope with hives, rashes, and acne. Here are photos of full body hives (above) and acne and rashes (below) in Sky Valley children:

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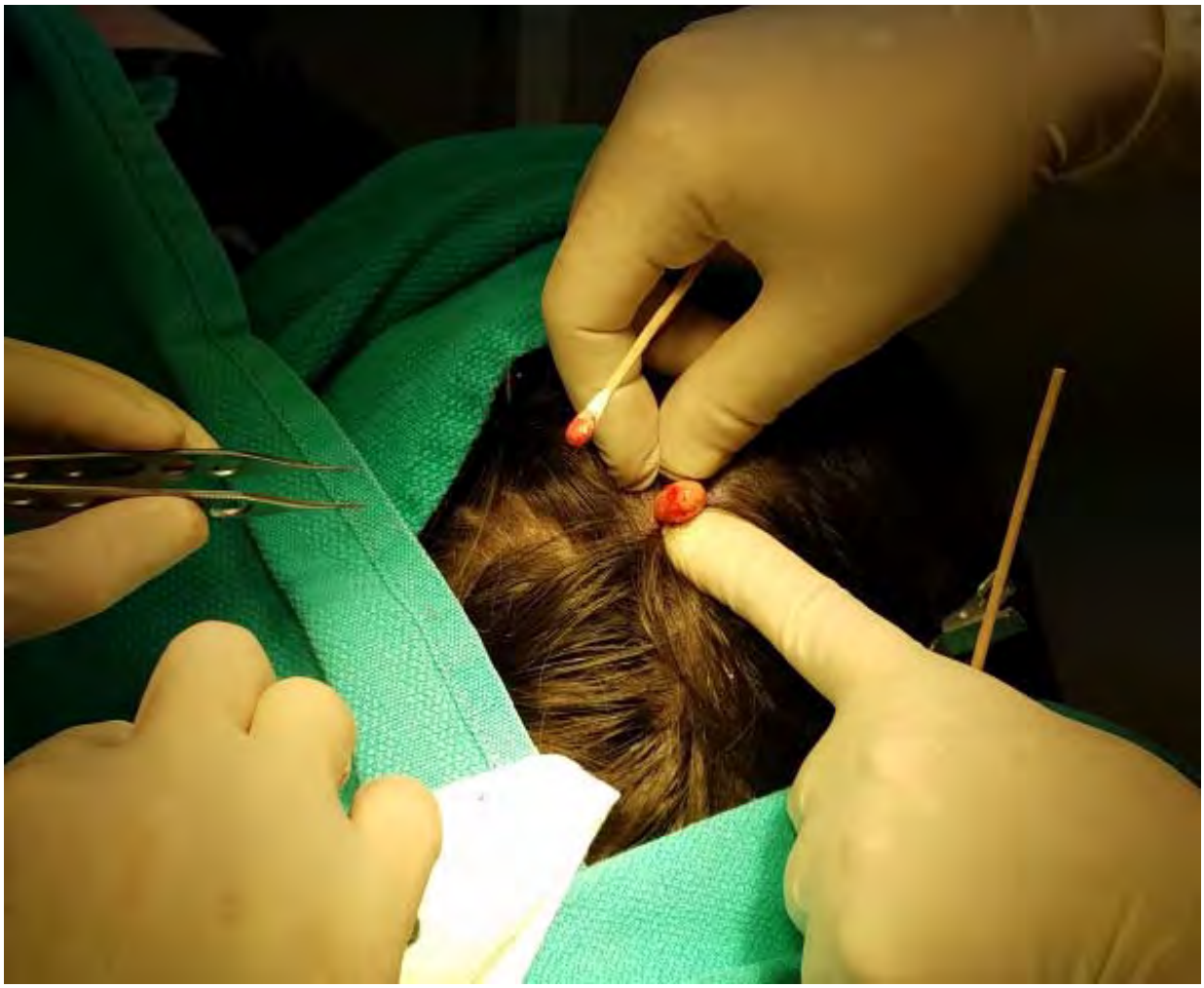
Dupuytren's Contracture (2017)

Left Hand (Noticed 1/2017)

Right Hand (Noticed 4/2017)



This is the first cyst (of a cluster) removed from a Sky Valley girl's scalp this past year.

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The photographs above are of about a dozen different Sky Valley individuals who developed skin, neurological, and other disorders as part of the constellation of symptoms they attribute to time spent in the school buildings before the School District remediated the buildings. Other photographs of children and adults in the hospital, whether due to encephalitis, cardiac problems, breathing problems, and neurological disorders—all of which have happened to Sky Valley children and adults—are not included. Plaintiffs will request entry of a protective order regarding Plaintiffs' medical records, identifiable photographs, and related personal information.

135. According to the Monroe School District's attorney, one defense asserted by the School District is that the levels of toxic contamination were never high enough to cause anyone harm.

136. The Health District's history of citing Monroe Public Schools for code and safety deficiencies at these school buildings establishes two basic facts: (1) Monroe School District and Union High have had a history since the 1950s of poor maintenance and safety compliance for these school buildings up to present-day; and (2) Snohomish Health District knew that these school buildings suffered from poor maintenance and non-compliance with safety requirements, particularly in areas of ventilation and lighting.

137. Despite this knowledge, the Monroe School District and Union High did not enforce compliance with the minimum safety requirements at these school buildings. That was negligent and a proximate cause of Plaintiffs' damages.

138. Despite this knowledge, the Snohomish Health District did not enforce "compliance with minimal environmental standards for education facilities, as per WAC 246-366-040," which was the purpose of the Health District's inspections, until late last year. That was negligent and a proximate cause of Plaintiffs' damages.

139. The State has constitutional and statutory duties to provide for and supervise the administration of educational services in Washington.

140. The State also knew that many of its school building in general—and these school buildings specifically—contained toxic chemicals such as PCBs.

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141. The State Departments of Ecology and Health both recognized that PCBs "can cause adverse health effects in humans and wildlife including cancer and harm to immune, nervous, and reproductive systems. PCBs disrupt thyroid hormone levels in animals and humans, hindering growth and development." State of Wash. Department of Ecology and Department of Health. PCB Chemical Action Plan (Feb. 2015), p. 12, available at https://fortress.wa.gov/ecy/publications/SummaryPages/1507010.html, (last accessed November 14, 2017).

142. These departments of the State have also been aware that toxic PCBs persist in school buildings built before 1979, and are aware that this represents a danger to the occupants of the buildings: "We are especially concerned about exposure to children in school buildings with old lamp ballasts and other PCB-containing building materials." *Id.* at 12.

143. The departments of the State know that old ballasts "are at a high risk for failing (dripping, smoking, and catching fire)." *Id.* at 15 (parenthetical explanation in original). The State recognized that the old ballasts release PCBs into the air breathed by children and other people in school buildings:

> Ballast failures can expose children to concentrated PCB oils and elevated PCBs in air. Low concentrations of lower chlorinated PCB congeners are continually released from lamp ballasts. When ballasts fail, high concentrations of a broader spectrum of congeners are released, so it is important to find and remove the lamp ballasts before they fail.

Id.

144. Despite recognizing this danger, the State did not require and supervise the removal of PCBs from these school buildings. The State's inaction created or increased the risk of harm to the Plaintiffs, causing them damages. This was negligent and a proximate cause of Plaintiffs' damages.

145. Stated differently, a reasonably careful governmental entity establishes and enforces policies to remove toxic chemicals such as PCBs from school buildings to prevent toxic exposure and to protect children, teachers, and parents from sickness, disease, and death.

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146. A reasonably careful provider of school buildings removes toxic chemicals such as PCBs to prevent toxic exposure and to protect children, teachers, and parents from sickness, disease, and death.

147. Broadly speaking, a reasonably careful school building inspector requires a building owner or operator to comply with the minimum environmental safety requirements to prevent injury and to protect the building's occupants from harm.

148. Specifically, a reasonably careful school building inspector requires a school building owner or operator to remove toxic chemicals such as PCBs to prevent toxic exposure and to protect children, teachers, and parents from sickness, disease, and death.

149. The public entity Defendants' failures to protect the Sky Valley children and adults from reasonably foreseeable harms were negligent.

150. The public entity Defendants' negligence in these and other ways was reasonably foreseeable to Monsanto and does not serve to cut off the chain of causation of Plaintiffs' damages.

151. Specifically, the State, the Monroe School District, and Union High used Monsanto's PCBs in a reasonably foreseeable manner, *i.e*. as components of caulking and light fixtures integral to the structures of the school buildings. The use of PCBs by the public entity Defendants was not so highly extraordinary as to be unforeseeable. In fact, the use of PCBs by these Defendants was consistent with Monsanto's intended promotion of its PCBs, *i.e.*, as components of caulking and light fixtures. In addition, the continued use of PCBs in school buildings is also reasonably foreseeable, as thousands of school buildings across the United States continue to use and contain PCBs.

152. Due to the negligence of the public entity Defendants, however, the Plaintiffs were exposed to PCBs and other toxic contamination. Their negligence was a proximate cause of Plaintiffs' damages.

153. Although the public entity Defendants and the Plaintiffs "used" Monsanto's PCBs as components of the structures and fixtures of the school buildings, the Plaintiffs

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themselves did not "misuse" Monsanto's PCBs.

154. The public entity Defendants' failures to require and supervise the removal of PCBs from the school buildings was caused in part by Monsanto's wrongful conduct. This is because Monsanto intentionally misrepresented facts about its PCB products, or intentionally concealed information about PCBs, and this wrongful conduct was a proximate cause of Plaintiffs' damages.

155. Specifically, Monsanto provided no warnings, notices, or bulletins to the State, the Snohomish Health District, the Monroe School District, Union High, or the Plaintiffs, which would have alerted them to the full extent of the dangers of toxic PCB exposure in school buildings. The reason is this: Monsanto profited for decades by producing and promoting PCBs, and Monsanto continues to have a strong financial interest in denying the environmental dangers and health hazards associated with toxic contamination caused by Monsanto's PCBs.

156. Due to the Defendants' wrongful conduct, the Plaintiffs have suffered past damages and will suffer future damages. Damages includes reasonable fears of present and future adverse medical consequences. *Wilson v. Key Tronic Corp.*, 40 Wn. App. 802, 701 P.2d 518 (1985) (where defendant operated a toxic landfill that poisoned local well water, plaintiffs' fears of present and future health problems stemming from actual ingestion of the toxic chemicals are reasonable and therefore compensable).

VI. LEGAL CONTEXT AND CAUSES OF ACTION

A. State law protects individual rights. Plaintiffs bring claims for damages against the named Defendants under state law only for strict products liability, negligence, and exemplary damages, as outlined below, and under other applicable state law remedies as discovery may reveal.

The Plaintiffs respectfully request that the guarantees of the Washington State Constitution weigh in the consideration of legal rulings in this case. "All political power is inherent in the people, and governments derive their just powers from the consent of the governed, and are established to protect and maintain individual rights." Wash.

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Const., Art. I, § 1. The Washington Supreme Court recognizes "that the judiciary has ample power to protect constitutional provisions that look to protection of personal 'guarantees,'" including "judicially enforceable affirmative duties of the State." *Seattle School Dist. No. 1 v. State of Washington*, 90 Wn.2d 476, 502, 585 P.2d 71 (1978). This includes the "paramount duty on the State to make ample provision for the education" of children. *Id.* Courts have "ample power" to protect such constitutional guarantees and personal rights:

> When it comes to considering individual rights such as are protected by the guaranties, that the right to trial by jury shall remain inviolate; that no person shall be deprived of life, liberty or property without due process of law; that no law shall grant to any citizen or class of citizens privileges or immunities which upon the same terms shall not equally belong to all citizens; and many other constitutional guaranties that look to protection of personal rights, the courts have ample power, and will go to any length within the limits of judicial procedure, to protect such constitutional guaranties.

Seattle School Dist. No. 1 v. State of Washington, 90 Wn.2d 476, 501, 585 P.2d 71 (1978) (holding in part that the school district, parents, and school children who were faced with deteriorating buildings and other shortfalls, had standing to sue the State for its violations of its paramount duty to make ample provision for the education of children), quoting *Gottstein v. Lister*, 88 Wash. 462, 493, 153 P. 595 (1915).

B. Plaintiffs are fault-free. Defendants cannot allege or show facts that would support a claim that the Plaintiffs, who spent time in these school buildings, are somehow at-fault for the toxic contamination and poisoning. The Plaintiffs are fault-free.

C. Negligence claims are covered claims. The claims against the public entities are for negligent provision, establishment, maintenance, inspection, and supervision of the school buildings, which were a legal cause of Plaintiffs' damages. Stated differently, the public entities negligently managed the safety of the school buildings, which caused the Plaintiffs' to suffer damages. No "pollution exclusion" would apply to deny coverage, even

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if such an exclusion exists in any policy of insurance in this case. *Xia v. ProBuilders Specialty Insur. Co.*, 188 Wn.2d 171, 393 P.3d 748 (2017).

D. Defendants' joint and several liabilities. These claims relate to negligence and product liability for "hazardous substances" that contaminated the school buildings and poisoned the Plaintiffs. As a result, all Defendants are jointly and severally liable for all of Plaintiffs' damages. RCW 4.22.070(3); *Coulter v. Asten Group, Inc.*, 135 Wn. App. 613, 146 P.3d 444 (2006), reconsideration denied, review denied, 161 Wn.2d 1011, 166 P.3d 1217.

E. Monsanto Defendants' product liabilities to the Plaintiffs.

1. **PCBs are a product.** Monsanto's PCBs are a "product" under Washington law. RCW 7.72.010(3).

2. **Strict product liability, not reasonably safe in construction (WPI 110.01).** A manufacturer of a product is liable if its product was not reasonably safe in construction and this was a proximate cause of plaintiff's damages. 6 Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 110.01 (6th ed.). A product is not reasonably safe in construction when it is "unsafe to an extent beyond that which would be contemplated by the ordinary consumer." *Id.*, citing RCW 7.72.030(3). Monsanto's PCBs are extremely toxic, and their toxicity was a proximate cause of Plaintiffs' damages. The existence of Monsanto's PCBs in the construction materials, caulking, and light ballasts of the school building was unsafe to an extent beyond that which was contemplated by the other Defendants, their employees, and the Plaintiffs who "used" the PCB-containing materials in the school buildings, which contaminated the buildings and caused PCB-poisoning in the Plaintiffs and others. Monsanto is strictly liable for Plaintiffs' damages.

3. **Strict product liability, not reasonably safe as designed (WPI 110.02).** A manufacturer of a product is liable if its product was not reasonably safe as designed at the time it left the manufacturer's control and this was a proximate cause of plaintiff's damages. A product may be not reasonably safe as designed under either a balancing test

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or a consumer expectations test. 6 Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 110.02 (6th ed.).

At the time Monsanto manufactured PCBs, there was a high likelihood that the PCBs would cause injuries similar to that claimed by the Plaintiffs, and the seriousness of the injuries is significant. This outweighed any "burden" on Monsanto to design a product that would have prevented the injuries (*i.e.*, alternative chemicals or mechanisms used in caulking, light ballasts, and other applications, that are not "extremely toxic"), and any adverse effect that a practical and feasible alternative design would have on the usefulness of the product. *Id.* Monsanto is also liable under the consumer expectations test, considering the following factors: the relative cost to the School District of replacing the caulking, light ballast fixtures, and other materials later discovered to be contaminated with Monsanto's PCBs; the seriousness of harm caused by exposure to PCBs is high; the cost to Monsanto of eliminating PCB production would have eliminated PCB profits, while the feasibility of eliminating or minimizing the risk was readily available to Monsanto; and other factors as may be revealed in discovery. *Id.*

Monsanto's PCBs were not reasonably safe as designed and this was a proximate cause of Plaintiffs' injuries following exposure to Monsanto's PCBs. This was reasonably foreseeable by Monsanto. In addition, any claimed "misuse" of toxic PCB-containing products by other Defendants, third parties, or even the Plaintiffs, was also reasonably foreseeable. Regardless, a product can be "not reasonably safe" even though the risk that it would cause the plaintiff's harm or similar harms was not foreseeable by the manufacturer at the time the product left the manufacturer's control. *Id.* (bracketed material). As designed, PCBs were not reasonably safe, and Monsanto is strictly liable for Plaintiffs' damages.

4. **Liability for negligence, "Comment K" unavoidably unsafe products (WPI 110.02.01).** A chemical manufacturer has a duty to use reasonable care to design chemicals that are reasonably safe. "Reasonable care" means the care that a reasonably prudent chemical manufacturer would exercise in the same or similar circumstances. A

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failure to use reasonable care is negligence. 6 Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 110.02.01 (6th ed.).

The question of whether a manufacturer exercised reasonable care is to be determined by what the manufacturer knew or reasonably should have known at the time of the plaintiff's injury. In determining what a manufacturer reasonably should have known in regard to designing its product, a jury should consider the following: a chemical manufacturer has a duty to use reasonable care to test, analyze, and inspect the product it sells, and is presumed to know what tests would have revealed; and a chemical manufacturer has a duty to use reasonable care to keep abreast of scientific knowledge, discoveries, advances, and research in the field, and is presumed to know what is imparted thereby. *Id.*

From the first decade of manufacture, Monsanto knew that its PCBs were toxic. The scientific research regarding the toxicity of PCBs increased over time. Despite the actual and imparted knowledge of PCB toxicity, Monsanto continued producing PCBs so Monsanto profited from their sales. Monsanto only stopped producing PCBs due to federal action banning their production. PCBs were never reasonably safe. They are toxic, durable, persistent, bioaccumulate, and are known to migrate from their source material to contaminate the surrounding environment. By their very nature as synthetic chemicals, PCBs were and are unavoidably unsafe products. Monsanto was negligent and is liable for Plaintiffs' damages.

5. **Liability for failure to provide warnings when manufactured (WPI 110.03).** A manufacturer has a duty to supply products that are reasonably safe. A product may be not reasonably safe because adequate warnings or instructions were not provided with the product. This can be proven either through a balancing test or a consumer expectations test. 6 Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 110.03 (6th ed.).

The balancing test establishes that Monsanto is liable: at the time of manufacture, there was a likelihood that PCBs would cause injury or damage similar to that claimed by

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the Plaintiffs, and given the seriousness of the injuries or damages, the lack of warnings by Monsanto were inadequate; and Monsanto could have provided adequate warnings or instructions. Monsanto could have provided warnings—but chose not to provide any warnings—such as "**CAUTION: CONTAINS PCBS (Polychlorinated Biphenyls), A TOXIC ENVIRONMENTAL CONTAMINANT REQUIRING SPECIAL HANDLING AND DISPOSAL**." Monsanto presumably chose not to provide such PCB warnings because the warnings would have reduced PCB sales and profits.

The consumer expectations test also proves that Monsanto is liable: the construction materials and fixtures containing PCBs are not cheap, and their replacement by the School District and the State would likely be a factor considered; the seriousness of potential disorders and diseases (including reproductive toxicity and cancers) caused by PCB exposure is extremely high, especially considering the vulnerability of children; the cost and feasibility of eliminating or minimizing the risk are substantial; and other factors as discovery may reveal. *Id.*

Monsanto's PCBs were not reasonably safe because adequate warnings or instructions were not provided, and this was a proximate cause of Plaintiffs' injuries. As a result, Monsanto is liable for Plaintiffs' damages.

6. **Liability for failure to provide warnings after manufacture (WPI 110.03.01).** A manufacturer has a duty to supply products that are reasonably safe. A product may be not reasonably safe because adequate warnings or instructions were not provided after the product was manufactured. 6 Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 110.03.01 (6th ed.). PCBs are not reasonably safe because adequate warnings or instructions were not provided after they were manufactured: (1) Monsanto learned, or a reasonably prudent manufacturer should have learned, about the dangers connected with PCBs (while and) after they were manufactured; (2) without adequate warnings or instructions, PCBs are unsafe to an extent beyond that which would be contemplated by an ordinary user such as the School District, the State, or the Plaintiffs; and (3) Monsanto failed to provide warnings or instructions concerning the dangers of PCBs in the manner

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that a reasonably prudent manufacturer would act in the same or similar circumstances. Because Monsanto did not provide adequate warnings or instructions after its PCBs were manufactured and this was a proximate cause of Plaintiffs' injuries, Monsanto is liable for Plaintiffs' damages.

7. **No "useful safe life" defense, statute does not apply.** A statute of repose enacted in 1981 provides a defense to some product manufacturers. It provides that "a product seller shall not be subject to liability to a claimant for harm under this chapter if the product seller proves by a preponderance of the evidence that the harm was caused after the product's 'useful safe life' had expired." RCW 7.72.060(1). The statute also provides that "'Useful safe life' beings at the time of delivery of the product and extends for the time during which the product would normally be likely to perform or be stored in a safe manner." RCW 7.72.060(1). The statute creates a presumption: "If the harm was caused more than twelve years after the time of delivery [of the product], a presumption arises that the harm was caused after the useful safe life had expired. This presumption may only be rebutted by a preponderance of the evidence." RCW 7.72.060(2).

Monsanto's PCBs were installed in the school buildings from the 1950s through the 1970s. Although the PCB-caulking and PCB-light ballasts continued to have *useful* product lives up to the time of remediation in 2016, the PCBs themselves never had *safe* lives due to their extreme toxicity. Monsanto knew that PCBs were toxic, but it provided no adequate warnings. As a result, the public entity Defendants were left uninformed by the manufacturer about the extent of the true dangers of PCBs. Up to the present day, PCBs remained as toxic as they were when Monsanto produced and promoted them. By the 1980s, the EPA termed PCBs "extremely toxic." The statute of repose requires a product to have had a useful safe life when manufactured; the plain meaning of "safe," however, does not include "extremely toxic." Due to their extreme toxicity, Monsanto's PCBs never had a safe life. PCBs are not and were not reasonably safe products. PCBs were and still are unavoidably unsafe products. A defense that applies to products having a "useful safe life" cannot and does not apply to PCBs.

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8. **No "useful safe life" defense, the indefinite persistence of PCBs means an indefinite "useful" life.** In the alternative, the chemical stability and persistence of PCBs means they have an indefinitely long "useful" life. In the school buildings, the PCB-light ballasts continued to perform their functions for decades, in fact, until 2016 when they were uninstalled. Likewise, the PCB-containing caulking continued to perform its function of sealing gaps between walls, window frames, and masonry joints, until the caulking was removed in 2016. The utility of the PCBs continued uninterrupted from the time of their installation in the school buildings until 2016, and the PCBs performed their functions throughout that time. RCW 7.72.060(1) ("'Useful safe life' begins at the time of delivery of the product and extends for the time during which the product would normally be likely to perform…"). The product seller statute of repose provides Monsanto no defense in this case.

9. **No "useful safe life" defense, statutory exception applies.** In the alternative, if the Court finds that PCBs had a safe life, then a statutory exception applies to deprive Monsanto of the defense. "A product seller may be subject to liability for harm caused by a product beyond its useful safe life if… The product seller intentionally misrepresents facts about its product, or intentionally conceals information about it, and that conduct was a proximate cause of the claimant's harm." RCW 7.72.060(1)(b). Monsanto has intentionally misrepresented facts about PCBs, or has intentionally concealed information about them, and that conduct was a proximate cause of Plaintiffs' harms. No "useful safe life" defense applies under this statutory exception.

10. **Statute of limitations.** For the Plaintiffs, the product liability claims did not accrue until spring of 2016, when the School District's environmental hygienists reported that Monsanto's PCBs contaminated the school buildings. RCW 7.72.060(3); *North Coast Air Services, Ltd. v. Grumman Corp.*, 111 Wn.2d 315, 759 P.2d 405 (1988); 16 Wash. Prac., Tort Law and Practice § 10:16 (4th ed.) (Oct. 2017 update) ("A three year discovery rule applies, with the provision that the statute begins to run when 'the claimant discovered or in the exercise of due diligence should have discovered the harm

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and its cause.'"). "The Washington Supreme Court has held that this statute extends the limitations period beyond the time when the harm occurred in circumstances when the claimant would have no reason to know about the causal connection to a defective product." *Id.*, citing *North Coast Air Services, Ltd.*, 111 Wn.2d 315. Before spring of 2016, the Plaintiffs had no reason to know that any harm that occurred was caused by PCBs and that they were manufactured by Monsanto.

11. **Foreseeability.** For decades, Monsanto produced and promoted PCBs for a wide variety of applications, including building materials and fixtures such as caulking and light ballasts. Monsanto's PCBs were installed in these school buildings between the 1950s and the 1970s. These building applications—and Monsanto's PCBs—are stable and durable. It was foreseeable that Monsanto's PCBs would be installed in such buildings, would persist up to the present day, and would harm people such as the Plaintiffs. This is due to several factors. The first is the stability and durability of PCBs, known to Monsanto. PCBs do not readily breakdown or decompose. This is one of their utilities and a reason that Monsanto produced and promoted them.

The second is the known propensity of PCBs to migrate from their sources and contaminate the surrounding environment. Monsanto has known for several decades that PCBs migrate from their sources into their surrounding environments and harm the organisms that live in those environments. Over the years, the PCBs migrated from their sources in caulking and light ballasts into the surrounding building materials such as bricks, carpets, and library books, all of which are absorptive and act as a toxic "sink." As shown by the EPA, the toxic sink then acts as a secondary source of toxic exposure to occupants of the school buildings, in addition to the ongoing primary sources of PCB exposure. In recent years, spikes in indoor air toxicity occurred due to PCB-light ballast failures in which PCB liquid dripped onto carpets and desks in classrooms, and in which failing PCB-light ballasts vented vapors and pyrolyzed byproducts such as dioxins and furans—which are highly toxic as well as foreseeable byproducts—into classroom air. The overall toxicity of the school buildings gradually increased every year until 2016,

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when inspectors discovered the PCB contamination and the Health District ordered the School District to remediate the buildings.

The third factor making the persistence of PCBs foreseeable in these school buildings is that Monsanto provided no warnings regarding their toxicity. Monsanto's knowing inaction made it more likely that the other Defendants would not act, causing more people, including school children, to become poisoned by Monsanto's PCBs. In short, it was foreseeable that Monsanto's PCBs would be left in place for decades in the school buildings while contaminating those buildings and slowly poisoning the people who use the buildings.

It was also foreseeable that other people and entities may be negligent in their provision, maintenance, inspection, or supervision of the school buildings, especially due to Monsanto's failures to warn. Any allegation by Monsanto of "misuse" of toxic PCB-containing products by other Defendants, third parties, or even the Plaintiffs, was a foreseeable "misuse" in part for this reason. Regardless, a product can be "not reasonably safe" even though the risk that it would cause the plaintiff's harm or similar harms was not foreseeable by the manufacturer at the time the product left the manufacturer's control. *See* WPI 111.02, -.03 (bracketed material). PCBs were not and still are not reasonably safe. Monsanto is strictly liable for Plaintiffs' damages.

12. **Missouri exemplary damages apply.** "Washington courts will apply the punitive damages law of other jurisdictions in product liability cases, if warranted under choice of law principles. In such a situation, the jury instructions on punitive damages should conform to the laws of the other state." 6 Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 110.00 (6th ed.), citing *Singh v. Edwards Lifesciences Corp.*, 151 Wn. App. 137, 143-44, 210 P.3d 337 (2009). Under a choice of law analysis, the Missouri law of punitive damages applies because Monsanto's reckless decisions and reprehensible conduct took place at Monsanto's headquarters in Missouri. In products liability cases under Missouri law, exemplary or punitive damages are available "if the defendant had actual knowledge of the defect and the danger and showed complete indifference or

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conscious disregard for the safety of others by selling the product anyway." 34 Mo. Prac., Personal Injury and Torts Handbook § 5.4 (2017 ed.), ¶ 17(e). Monsanto produced and promoted PCBs, an unreasonably dangerous product, with actual knowledge of their dangers. *Id.* at ¶ 11. Monsanto knowingly concealed the hazards of its PCBs and marketed them as safe for open and closed applications in order to maximize Monsanto's profits from PCB sales. *See, e.g., City of San Jose v. Monsanto Co.*, 231 F. Supp. 3d 357, 366 (N.D. Cal. 2017) (denying Monsanto's motion to dismiss the claim for punitive damages on these facts while holding that the Cities stated a claim for public nuisance based on PCB contamination).

F. Public entity negligence.

1. **Standing of the State to be sued.** The State may be sued for its wrongdoing that damages its residents: "The state of Washington, whether acting in its governmental or proprietary capacity, shall be liable for damages arising out of its tortious conduct to the same extent as if it were a private person or corporation." RCW 4.92.090. The State's "waiver [of immunity] is very broad." State of Washington JLARC Report 11-8 (2011): State Risk Management Practices in Washington at 5.

2. **State's direct liability for negligence.** "A person conducting an activity through servants or other agents is subject to liability for harm resulting from his conduct if he is negligent or reckless (a) in giving improper or ambiguous orders or in failing to make proper regulations." Restatement (Second) of Agency, § 213(a); *see also* Comment g ("Inadequate regulations. A master is negligent if he fails to use care to provide such regulations as are reasonably necessary to prevent undue risk of harm to third persons or to other servants from the conduct of those working under him. See § 508 and the Restatement of Torts, § 317. One who engages in an enterprise is under a duty to anticipate and to guard against the human traits of his employees which unless regulated are likely to harm others. He is likewise required to make such reasonable regulations as the size or complexity of his business may require."). The State gave improper or ambiguous orders or failed to make proper regulations reasonably necessary to prevent

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undue risk of harm to children and adults at Sky Valley Education Center. The State negligently provided, maintained, and supervised education in these school buildings. The State's negligence exposed the Plaintiffs to toxic chemicals and caused harm. The State is directly liable to the Plaintiffs for its own negligence.

3. **State's vicarious liability through negligence of its agents.** Any negligence of a State agent within the scope of his or her authority is the negligence of the State. 6 Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 50.03 (6th ed.) (modified). Constitutional and statutory provisions "impose on the state an obligation to provide an integrated system of agencies for the acquisition, construction, financing, administration, supervision, maintenance, and operation of public schools." Robert F. Utter and Hugh D. Spitzer, The Washington State Constitution 154 (2002); *State ex. Rel. DuPont-Fort Lewis School Dist. No. 7 v. Bruno*, 62 Wn.2d 790, 384 P.2d 608 (1963). "The state exercises its sovereign powers and fulfills its duties of providing education largely by means of a public school system under the direction and administration of the State Superintendent of Public Instruction, State Board of Education, school districts, and county school boards." *Edmonds School Dist. No. 15 v. City of Mountlake Terrace*, 77 Wn.2d 609, 611, 465 P.2d 177 (1970); *see also* Restatement (Second) of Agency, § 214 (1958). State employees negligently provided, inspected, maintained, operated, and supervised the education in these school buildings, causing Plaintiffs to become exposed to toxic chemicals and suffer damages. The State is vicariously liable for this negligent conduct.

4. **State's vicarious liability through acting in concert.** The State, Monroe School District, and Union High are bound together in a joint obligation: "a school district is a corporate arm of the state established as a means of carrying out the state's constitutional duties and exercising the sovereign's powers in providing education." *Edmonds School Dist. No. 15 v. City of Mountlake Terrace*, 77 Wn.2d 609, 611-12, 465 P.2d 177 (1970). Specifically, "in the matter of education, a school district is deemed to be an arm of the state for the administration of the school system." *Edmonds School Dist.*, 77 Wn.2d at 614, citing *Howard v. Tacoma School Dist. No. 10*, 88 Wash. 167, 152 P.

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1004 (1915). "It follows that the school district exercises the paramount power of the state in providing education and carries out the will of the sovereign state as to all matters involved in the educational processes and in the conduct, operation, and management of the schools." *Id.* at 614-615; *see also State ex rel. DuPont-Fort Lewis School Dist. No. 7, Pierce County v. Bruno*, 62 Wn.2d 790, 384 P.2d 608 (1963). As a legal consequence, the State is vicariously liable for the negligence of its "arms," the Monroe School District and Union High, that caused damage to the Plaintiffs in this case.

5. **State's paramount, nondelegable duty.** "It is the paramount duty of the state to make ample provision for the education of all children residing within its borders…" Wash. Const., Art. IX, § 1; *McCleary v. State*, 173 Wn.2d 477, 520, 269 P.3d 227 (2012) ("paramount" means "having the highest rank that is superior to all others… the State's first and highest priority before any other State programs or operations"); *Seattle School Dist. v. State*, 90 Wn.2d 476, 511, 514, 585 P.2d 71 (1978). This is the only declaration in the State Constitution "that a specified state function is the state's 'paramount duty.'" Robert F. Utter and Hugh D. Spitzer, The Washington State Constitution 154 (2002); *Seattle School Dist.*, 90 Wn.2d at 523. This paramount duty is "mandatory" on the State, and "the State may discharge its duty only by performance." *Seattle School Dist.*, 90 Wn.2d at 500, 513; Wash. Const., Art. I, § 29. The paramount duty of the State "creates a correlative right on behalf of all children residing within the borders of the state." *Seattle School Dist. v. State*, 90 Wn.2d 476, 510-13, 585 P.2d 71 (1978). This is a "true right" created by a "positive constitutional grant." "Positive constitutional rights do not restrain government action; they require it." *McCleary v. State*, 173 Wn.2d 477, 518-19, 269 P.3d 227 (2012).

6. **State's duty to provide, establish, maintain, and supervise reasonably safe school buildings.** "Provision shall be made for the establishment and maintenance of systems of public schools free from sectarian control which shall be open to all the children of the said state." Wash. Const., Art. XXVI, § 4. The State "shall provide for a general and uniform system of public schools." Wash. Const., Art. IX, § 2. "The

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establishment and maintenance of the public schools throughout the state are essential and are primarily a state purpose." Robert F. Utter and Hugh D. Spitzer, The Washington State Constitution 156 (2002). "The superintendent of public instruction shall have supervision over all matters pertaining to public schools, and shall perform such specific duties as may be prescribed by law." Wash. Const., Art. III, § 22. These constitutional provisions impose duties on the State to provide, establish, maintain, and supervise "all matters pertaining to public schools."

In addition, the State has the "fundamental responsibility" to protect the public's health. RCW 43.70.512(1) ("Protecting the public's health across the state is a fundamental responsibility of the state"); RCW 43.70.005 ("The legislature finds and declares that it is of importance to the people of Washington state to live in a healthy environment"). This includes the safe management of hazardous waste. The State knows that the "[s]afe and responsible management of hazardous waste is necessary to prevent adverse effects on the environment and to protect public health and safety." RCW 70.105.005(2). "The health and welfare of the people of the state depend on clean and pure environmental resources unaffected by hazardous waste contamination." RCW 70.105.005(1). Specifically, to protect health in school buildings, the State must "adopt rules controlling public health related to environmental conditions including but not limited to heating, lighting, ventilation, sanitary facilities, and cleanliness in public facilities including… schools." RCW 43.20.050(2)(d). To protect children and adults in school buildings, the State must exercise its duties in part through the State Department of Health, the Board of Health, and in conjunction with local boards of health that "shall enforce all rules adopted by the state board of health." RCW 43.20.050(5).

It was foreseeable—and the State actually knew—that these school buildings were or have been contaminated with hazardous waste or toxic substances such as PCBs, and that mismanagement can harm the occupants of those buildings, including the school buildings in this case. The State's neglect and negligent inaction regarding toxic chemicals in these school buildings caused foreseeable harm to the Plaintiffs.

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7. **State's standard of reasonable care for provision, establishment, maintenance, and supervision of these school buildings.** Together with local governmental entities, the State must provide, establish, maintain, and supervise reasonably safe school buildings for the Sky Valley Education community to prevent injury and to protect the children and adults who use those buildings. Reasonably safe school buildings do not expose their occupants to toxic or hazardous chemicals that cause injury or disease. Stated differently, school buildings that expose their occupants to toxic or hazardous chemicals that cause injury or disease are not reasonably safe. Through its agencies and employees, the State must also provide reasonably careful supervision of school districts in their provision and maintenance of school buildings. Although this paramount duty to provide and maintain reasonably safe school buildings primarily benefits children, the duty extends to reasonably foreseeable third parties such as teachers, parents, and other members of the community.

8. **State violated its duty.** The existence of inadequate or unhealthful school buildings can constitute violations of the State's constitutional duty to children. *Seattle School Dist. v. State*, 90 Wn.2d 476, 524-526, 585 P.2d 71 (1978) (State violated its constitutional duty to school district, parents, and children who were "faced with a deteriorating physical plant" and lacked other educational necessities); *Ramsdell v. North River School Dist.*, 104 Wn.2d 264, 704 P.2d 606 (1985) (citing *Seattle School Dist.* and noting that inadequacy of facilities may be a constitutional violation). The State violated its duty of reasonable care by allowing PCBs and other toxic contamination to remain in these school buildings. The toxic poisoning of the Plaintiffs was a foreseeable and avoidable consequence of the State's negligence.

During the several years of the negligent acts and omissions that caused the school buildings to poison the Plaintiffs by toxic contamination, the State was meanwhile violating its duty to make ample provision for education. *McCleary v. State*, 173 Wn.2d 477, 532-537, 269 P.3d 227 (2012) (finding education to be "woefully underfunded"). "The State has failed to meet its duty under Art. IX, sec. 1 by consistently providing

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school districts with a level of resources that falls short of the actual costs of the basic education program." *McCleary*, 173 Wn.2d at 547. "School districts" include Monroe School District and Union High. This may be relevant to the extent Monroe School District or Union High allege that any negligence on their part was a consequence of underfunding by the State, although the School District was clearly able to remediate the buildings in 2016, regardless of budgetary constraints, when ordered to do so by the Health District.

Through its agencies, departments, and employees, the State breached its duties of reasonable care to the Plaintiffs by not providing reasonably safe school buildings; by not maintaining the school buildings free of toxic and hazardous substances that cause injury and disease; and by not providing reasonably careful supervision of Snohomish Health District, Monroe School District, and Union High, as they inspected, maintained, and administered educational services at the school buildings now known as Sky Valley Educational Center. Based on the known facts, the State breached its duties in these and other ways as discovery and legal research may reveal.

9. **The State remains in contempt of the Supreme Court of Washington.** The State has been in contempt of the Supreme Court's *McCleary* decision while the negligence regarding the school buildings caused the Plaintiffs to be exposed to toxic contamination. *McCleary v. State*, No. 84362-7 (Wash. Sept. 11, 2014) (order of contempt); (Wash. August 13, 2015) (order imposing sanction of $100,000 per day penalty on the State for each day it fails to adopt a complete plan to comply with its constitutional duty); (Wash. Oct. 6, 2016) ("monetary sanction of $100,000 per day shall remain in place and continue to accrue until the State purges its contempt by adopting a complete legislative plan demonstrating how it will fully comply with article IX, section 1 of the Washington Constitution by September 1, 2018); (Wash. Nov. 15, 2017) (same).

10. **State's violations caused Plaintiffs' damages.** The State's breaches of its duties exposed the Plaintiffs to toxic and hazardous substances that caused injury and disease. The State's negligence is a legal cause of Plaintiffs' damages.

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11. **No Title 51 immunity.** The State is not an employer of any Plaintiff and therefore is not entitled to claim immunity under Title 51. RCW 51.08.070; *Afoa v. Port of Seattle*, 176 Wn.2d 460, 482, 296 P.3d 800 (2013) (Port of Seattle liable in tort to injured worker employed by third-party employer). There are no express contracts or acts that show any of the Plaintiffs or the State recognized one as the employee and the other as the employer. *Hubbard v. Dept. of Labor and Indus.*, 198 Wash. 354, 88 P.2d 423 (1939); *Fisher v. City of Seattle*, 62 Wn.2d 800, 384 P.2d 852 (1963) (relationship of employer and employee cannot exist without consent of employee for purposes of workers compensation laws).

12. **State and public entity claims against Monsanto.** In 2016, the State sued Monsanto Company, Solutia, Inc., and Pharmacia Corporation for PCB contamination in Washington, alleging public nuisance, products liability (defective design), products liability (failure to warn), negligence, equitable indemnity, and statutory trespass. King County Superior Court, Case No. 16-2-29591-6-SEA. Against the Monsanto Defendants, "the State seeks damages, including on behalf of itself and on behalf of its residents in its *parens patriae* capacity," for Monsanto's PCB contamination in the State of Washington. Complaint for Damages at 5. Under the *nullum tempus* doctrine, no statute of limitations defense shall apply to the State's claims or to the claims of other public entity Defendants bringing claims for the benefit of the State. RCW 4.16.160 ("except as provided in RCW 4.16.310, there shall be no limitation to actions brought in the name or for the benefit of the state, and no claim of right predicated upon the lapse of time shall ever be asserted against the state"); *State v. LG Electronics, Inc.*, 186 Wn.2d 1, 8, 12, 375 P.3d 636 (2016) (noting that "the legislature has expressly instructed that the State shall not be subject to policies of preventing stale claims inherent in statute of limitations because of competing policy considerations regarding the public welfare and the State's purse.") (antitrust *parens patriae* case). While the public entity Defendants may have claims against Monsanto arising out of the damages in this case, Monsanto does not have viable counterclaims against non-Monsanto parties in this case. *See, e.g., City of Spokane v.*

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Monsanto Co., No. 2:15-CV-00201-SMJ, 2017 WL 2945729 (E.D. Wash. July, 10, 2017) (dismissing Monsanto's counterclaims against plaintiff City of Spokane).

13. **Standing of Monroe School District No. 103.** The School District shall be liable for damages arising out of its tortious conduct. RCW 4.96.010; RCW 4.08.120 ("An action may be maintained… for an injury to the rights of the plaintiff arising from some act or omission of such county or other public corporation."); RCW 39.50.010(c).

14. **Monroe School District's direct liability for negligence.** The School District shall be liable for its own failures to hire, train, or supervise its employees in the performance of the duties of provision, inspection, and maintenance of the environmental safety requirements for the school buildings. *Id.*; Restatement (Second) of Agency, § 213(a).

15. **Monroe School District's vicarious liability for negligence.** Any negligence of a school district board member, administrator, or employee within the scope of his or her authority is the negligence of the school district. 6 Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 50.03 (6th ed.) (modified). The law "guarantee[s] that each common school district board of directors, whether or not acting through its respective administrative staff, be held accountable for the proper operation of their district to the local community and its electorate." RCW 28A.150.230.

16. **Statutory duties.** Monroe School District "shall: (a) Cause all school buildings to be properly heated, lighted, and ventilated and maintained in a clean and sanitary condition; and (b) Maintain and repair, furnish, and insure such school buildings." RCW 28A.335.010(1). It is "the responsibility of the certificated teaching and administrative staff in each common school to: …(e) Give careful attention to the maintenance of a healthful atmosphere in the classroom. [And] (f) Give careful attention to the safety of the student in the classroom and report any doubtful or unsafe conditions to the building administrator." RCW 28A.150.240(2); 6 Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 60.01 (6th ed.); *Swank v. Valley Christian School*, 188 Wn.2d 663, 398 P.3d 1108 (2017) (holding that a statute enacted to protect student safety created an

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implied remedy for violations of the statute).

17. **Common law duty to students.** School districts "have a special relationship with the students in their custody," and "[b]ased on this relationship, school districts have a duty to anticipate dangers which may reasonably be anticipated, and then to take precautions to protect the pupils in [their] custody from such dangers." *Henrickson v. Moses Lake School Dist.*, 199 Wn. App. 244, 249, 398 P.3d 1199 (2017), citing *McLeod v. Grant County School Dist.*, 42 Wn.2d 316, 320, 255 P.2d 360 (1953). The duty is based on "the well-established law in Washington that a school district has an enhanced and solemn duty to protect minor students in its care." *Quynn v. Bellevue School District.*, 195 Wn. App. 627, 634, 383 P.3d 1053 (2016), citing *Christensen v. Royal School Dist. No. 160*, 156 Wn.2d 62, 67, 124 P.3d 283 (2005).

18. **Monroe School District's duty.** The School District must provide and maintain reasonably safe school buildings to prevent injury and to protect the children and adults who use those school buildings. The School District must provide and maintain school buildings free of PCBs and other toxic chemicals to prevent injury and to protect the children and adults who use those school buildings.

19. **Monroe School District violated its statutory duty.** Monroe School District violated its statutory duty to cause the school buildings to be properly lighted, ventilated, and maintained in a clean and sanitary condition. Monroe Public Schools also violated its statutory duty to give careful attention to the maintenance of a healthful atmosphere and the safety of the students. The School District's violations of the statutes were negligent and legal causes of harm to students and their parents, including the Plaintiffs. 6 Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 60.03 (6th ed.). The violations occurred over many years and were multiple and separate negligent acts and omissions during those years. Discovery and legal research may reveal more violations.

20. **Monroe School District violated its common law duty.** Monroe School District violated its common law duties, based on its special relationship with the students in its custody, to anticipate the dangers of toxic contamination within the old school

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buildings, and then to take precautions to protect the students from exposure to the toxic contamination. The School District's violations of its common law duties were negligent and legal causes of harm to students and their parents, including the Plaintiffs. Discovery and legal research may reveal more violations.

21. **Monroe School District's duty to public invitees**. Monroe School District owes to its public invitees a duty to exercise ordinary care. This includes the exercise of ordinary care to maintain in a reasonably safe condition those portions of the premises that the invitee is expressly or impliedly invited to use or might reasonably be expected to use. 6A Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 120.06 (6th ed.).

22. **Monroe School District is liable for violating its duty to public invitees.** Monroe School District is liable for any injuries to its public invitees caused by a condition on the premises if the School District (a) knows of the condition or fails to exercise ordinary care to discover the condition, and should realize that it involves an unreasonable risk of harm to public invitees; (b) should expect that they will not discover or realize the danger, or will fail to protect themselves against it; and (c) fails to exercise ordinary care to protect them against the danger. 6A Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 120.07 (6th ed.). *See also* Restatement (Second) of Torts § 343 "Dangerous Conditions Known to or Discoverable by Possessor," (1965), which Washington courts have cited for the duties owners or occupiers of land owed to invitees. *See, e.g.*, *Tincani v. Inland Empire Zoological Soc.*, 124 Wn.2d 121, 875 P.2d 621 (1994); *Ford v. Red Lion Inns*, 67 Wn. App. 766, 840 P.2d 198 (1992). Landowners owe to invitees a duty of reasonable care requiring them to inspect for dangerous conditions and to make such repair, safeguards, or warnings as may be reasonably necessary for the protection of invitees under the circumstances. *Tincani v. Inland Empire Zoological Soc.*, 124 Wn.2d at 139. This duty of reasonable care includes an "affirmative duty to discover dangerous conditions." *Egede-Nissen v. Crystal Mountain, Inc.*, 93 Wn.2d 127, 132, 606 P.2d 1214 (1980) (citing Restatement (Second) of Torts § 343, comment b); *Jarr v. Seeco Const. Co.*, 35 Wn. App. 324, 326, 666 P.2d 392 (1983).

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23. **Monroe School District violated its duty to public invitees.** For years, Monroe School District invited members of the public to use the school buildings, including parents, staff members, and community members, including the Plaintiffs. The Monroe School District: knew or should have known that the school buildings contained toxic contamination; knew or should have known that the toxic contamination involved an unreasonable risk of harm to the Plaintiffs; and knew or should have known that the Plaintiffs would not discover or realize the danger of the toxic contamination. Despite this knowledge, Monroe School District failed to exercise ordinary care to protect Plaintiffs from exposure to the toxic contamination in the school buildings. Due to its negligent acts and omissions, the Monroe School District caused the Plaintiffs to suffer injuries. The negligent acts and omissions occurred over many years and were multiple and separate negligent acts and omissions during those years. Discovery and legal research may reveal more violations.

24. **Monroe School District's duty to staff members.** "In Washington, an employer has an affirmative and continuing duty to provide all employees a reasonably safe place to work." *McCarthy v. Dept. of Social and Health Services*, 110 Wn.2d 812, 818, 759 P.2d 351 (1988).

25. **Monroe School District violated its duty and may be liable to Plaintiffs who were staff members.** Due to the toxic contamination at the school buildings, Monroe School District failed to provide its employees with a reasonably safe place to work. Monroe School District is liable to staff member Plaintiffs to the extent their damages fall outside the scope of Title 51. *McCarthy v. Dept. of Social and Health Services*, 110 Wn.2d 812, 818, 759 P.2d 351 (1988); *Birklid v. Boeing Co.*, 127 Wn.2d 853, 904 P.2d 278 (2003); WPI 32.04 (Measure of Damages—Loss of Consortium—Spouse); WPI 32.05 (Measure of Damages—Loss of Consortium—Parent).

26. **Union High as landowner and school district.** According to Snohomish County tax assessor records, Union High School District No. 402 is the owner of the land occupied by the old Monroe Middle School, currently known as Sky Valley Education

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Center, and used by the Monroe School District. Union High is also a school district and is liable to Plaintiffs in the same ways as Monroe School District, although Union High is not an employer of any Plaintiff and cannot allege Title 51 immunity. Union High violated its statutory and common law duties to the Plaintiffs in the same manner as did Monroe School District, outlined above. The violations were a legal cause of damages to Plaintiffs. Union High failed to maintain safe premises, violated common law and statutory duties to maintain a safe workplace, and is jointly and severally liable with the State and other Defendants to all Plaintiffs. *Afoa v. Port of Seattle*, 176 Wn.2d 460, 482, 296 P.3d 800 (2013); *Afoa v. Port of Seattle*, 198 Wn. App. 206, 393 P.3d 802 (2017). Discovery and legal research may reveal more violations.

27. **Joint liability.** Each school district "is a corporate arm of the state established as a means of carrying out the state's constitutional duties and exercising the sovereign's powers in providing education." *Edmonds School Dist. No. 15 v. City of Mountlake Terrace*, 77 Wn.2d 609, 611, 465 P.2d 177 (1970). The State, Monroe School District, and Union High are bound together in this joint duty. *Id.*; RCW 28.A.150.070; Wash. Const., Art. IX, § 2. Two or more governmental entities act in concert if they consciously act together in an unlawful manner, although it is not necessary that they intend to harm the plaintiff. 6 Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 50.20 (6th ed.). One governmental entity is liability for the fault of another if both were acting in concert with respect to a particular act or omission and that act or omission was a proximate cause of the plaintiff's injuries. 6 Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 50.21 (6th ed.). Monroe School District, Union High, and the State acted in concert to provide to Plaintiffs the school buildings contaminated with toxic chemicals, which was a proximate cause of exposing Plaintiffs to the toxins and injuring them. Each of these three entities is liable for the fault of the other two.

28. **Monroe School District and Union High, causes of action.** Monroe School District and Union High may have causes of action against the State and the product manufacturer Defendants in this case. RCW 4.08.110; *Seattle School Dist. No. 1*

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v. State, 90 Wn.2d 476, 490, 585 P.2d 71 (1978) (holding in part that the school district faced with deteriorating buildings and other shortfalls had standing to sue the State for its violations of its paramount duty to make ample provision for the education of children). No statute of limitations applies as a defense against school district claims brought to benefit the State against a corporate defendant such as Monsanto. *Bellevue School Dist. No. 405 v. Brazier Constr. Co.,* 103 Wn.2d 111, 114, 691 P.2d 178 (1984); *cf. Wash. State Major League Baseball Stadium Public Dist. v. Huber, Hunt & Nichols-Kiewit Constr. Co.*, 176 Wn.2d 502, 514, 296 P.3d 821 (2013) (noting statutory amendment after *Brazier Constr.* to RCW 4.16.160 and -.310, providing that "the State is subject to the construction statute of repose"); RCW 4.16.160 ("except as provided in RCW 4.16.310, there shall be no limitation to actions brought in the name or for the benefit of the state, and no claim of right predicated upon the lapse of time shall ever be asserted against the state").

29. **Standing of the Snohomish Health District.** The Health District shall be liable for damages arising out of its tortious conduct. RCW 4.96.010; RCW 4.08.120 ("An action may be maintained… for an injury to the rights of the plaintiff arising from some act or omission of such county or other public corporation."); RCW 39.50.010(c).

30. **Health District's direct liability for negligence.** The Health District shall be liable for its own failures to hire, train, or supervise its employees in the performance of the duties of inspection and enforcement of minimal environmental safety requirements for the school buildings. *Id.*; Restatement (Second) of Agency, § 213(a).

31. **Health District's vicarious liability for negligence.** Any negligence of a Health District board member, administrator, or employee within the scope of his or her authority is the negligence of the Health District. 6 Wash. Prac., Wash. Pattern Jury Instr. Civ. WPI 50.03 (6th ed.) (modified).

32. **Health District's joint obligation with the State to enforce safety requirements in the school buildings.** The State Board of Health and the Snohomish Health District have a joint obligation to protect public health in school buildings in

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Snohomish County. To protect public health, the State Board of Health shall establish safety requirements for water quality, air quality, and environmental conditions in school buildings, "including but not limited to heating, lighting, ventilation, sanitary facilities, and cleanliness." RCW 43.20.050(2)(d). The Snohomish Health District shall enforce these requirements. RCW 43.20.050(5). The requirements are designed for the benefit and protection of the children and adults who use public school buildings. *Bailey v. Town of Forks*, 108 Wn.2d 262, 268, 737 P.2d 1257 (1987) (noting one exception to the public duty doctrine is "when the terms of a legislative enactment evidence an intent to identify and protect a particular and circumscribed class of persons (legislative intent)").

33. **Healthy District's duty to inspect school buildings.** The Health District must inspect school buildings and enforce safety requirements to prevent injury and to protect the children and adults who use the school buildings.

34. **Health District's duty to take corrective action and enforce safety requirements.** The Health District must take corrective action and enforce safety requirements in school buildings to prevent injury and to protect the children and adults who use the school buildings.

35. **Health District breached its duties to the Plaintiffs, causing them harm.** For years, the Health District knew that the school buildings were violating environmental safety requirements. For those same years, the Health District had a duty to inspect, verify compliance, and order compliance with environmental safety requirements at the school buildings. But the Health District failed to enforce compliance until the spring of 2016, by which time many people, including the Plaintiffs, had suffered toxic poisoning. In addition, the Health District knowingly and negligently delayed enforcement and waited while dozens of people reported illnesses and diseases attributed to the school buildings. The Health District specifically told Plaintiffs and others harmed by the hazardous conditions in the school buildings that the Health District would take no enforcement action until many people became sickened by the contamination at the school buildings. The Health District chose not to act until 2016,

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when it finally ordered environmental testing and remediation of the hazardous substances in the school buildings. The Health District violations of its duties were legal causes of harm to the Plaintiffs.

The Health District is liable to the Plaintiffs and other reasonably foreseeable occupants of the school buildings for the toxic exposures that caused them harm. *Campbell v. City of Bellevue*, 85 Wn.2d 1, 530 P.2d 234 (1975) (duty imposed on electrical inspector who knew of nonconforming electrical system but failed to enforce electrical code compliance, causing injury and death); *Halvorson v. Dahl*, 89 Wn.2d 673, 574 P.2d 1190 (1978) (claim may be made against city for its long-term knowledge of, and inadequate response to, hotel's noncompliance with safety codes); *Bailey v. Town of Forks*, 108 Wn.2d 262, 737 P.2d 1257 (1987) (liability against police officer who allowed drunk driver to drive his truck, hitting motorcyclist). When the Health District finally acted in 2016 on the school buildings, it found "[t]he existence of unsafe conditions which present a potential hazard to occupants of the school [which] are in violation of these regulations." WAC 246-366-140(1); RCW 43.20.050 (health district shall enforce minimum safety requirements in school buildings); *Swank v. Valley Christian School*, 188 Wn.2d 663, 398 P.3d 1108 (2017) (holding that a statute enacted to protect student safety created an implied remedy for violations of the statute). The same "unsafe conditions" had been present for months, years, and decades beforehand, had harmed the children and adults in the school buildings, and had been known to the Health District. The Health District's failure to enforce the safety requirements at the school buildings was a proximate cause of Plaintiffs' damages.

G. Roes. Roes 1 through 10 are public entities or public or private corporations who may be liable for causing injuries to the Plaintiffs. Currently, it is not known if named Defendants will allege fault against these entities or corporations. Plaintiffs request leave to amend this Complaint if Defendants allege fault against third parties, or if facts become known showing liability against third parties. Third parties Snohomish County, Northwest Education Service District #189, City of Monroe, EHS-International, and McKinstry Corp.

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are being given notice of this lawsuit. If they or another third party are added as Defendants, the new claims in the amended pleadings relate back to the original complaint. CR 15(c).

H. Admonition of the *Environmental Defense Fund* decision. Years before many of the Plaintiffs in this case were born, the federal district court for the District of Columbia advised that action must be taken to prevent toxic environmental poisoning and to protect future generations:

> We feel constrained to add one final note to emphasize our concern in this case. Human beings have finally come to recognize that they must eliminate or control life threatening chemicals, such as PCBs, if the miracle of life is to continue and if earth is to remain a living planet. This is precisely what Congress sought to do when it enacted section 6(e) of the Toxic Substances Control Act. Yet, we find that forty-six months *1287 after the effective date of an act designed to either totally ban or closely control the use of PCBs, 99% of the PCBs that were in use when the Act was passed are still in use in the United States. With information such as this in hand, timid souls have good reason to question the prospects for our continued survival, and cynics have just cause to sneer at the effectiveness of governmental regulation.

Environmental Defense Fund v. Environmental Protection Agency, 636 F.2d 1267, 1286-87 (D.C. Cir. 1980) (internal citation omitted).

I. Accountability. The Plaintiffs respectfully request that each of the Defendants be held accountable for their roles in causing the toxic poisonings in this case.

VII. PRAYERS FOR RELIEF

A. Request for preservation of evidence. Plaintiffs request that all Defendants and third parties given notice of this lawsuit preserve all evidence that may potentially be relevant.

B. Ex parte contact is prohibited. Many Plaintiffs are individuals who attend, visit, or work at locations within the School District. Plaintiffs request that defense attorneys instruct their agents, employees, defendant employees, and defendants' agents to please refrain from any ex parte contact with Plaintiffs regarding the subject matter of this lawsuit, whether in school buildings, hospitals, or other locations. This request includes the non-

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physician State or University of Washington Medical Center employee(s) who have observed or attempted to observe clinical evaluations of injured Sky Valley teachers, parents, and children.

C. Limited waiver of physician-patient privilege. Under RCW 5.60.060(4)(b), Plaintiffs hereby waive the physician-patient privilege only insofar as necessary to place damages at issue at the time of trial. Plaintiffs' actions do not constitute a waiver of any of their constitutional or statutory rights. Defendants, defense attorneys, and their agents are not to contact any treating physicians without first notifying plaintiff counsel, so the matter may be negotiated or brought to the attention of the Court. *Loudon v. Mhyre*, 110 Wn.2d 675 (1988); *Smith v. Orthopedics International, Ltd., P.S.*, 170 Wn.2d 659 (2010).

D. Motion practice.

1. Plaintiffs' attorneys will move for the appointment of appropriate guardians *ad litem* to represent the interests of Plaintiffs who are minors.

2. Plaintiffs will request relief during litigation through stipulation or motion practice for a limited protective order to provide appropriate psychological, privacy, and personal identification information protections for Plaintiffs.

3. Plaintiffs may request leave to amend the complaint, as discovery or Defendants' answers may require.

4. Plaintiffs may request leave to reform the caption to reflect the addition or deletion of parties.

5. Plaintiffs may request other relief as may be appropriate during litigation.

E. Judgment for damages. Plaintiffs demand judgment against Defendants, and each of them, individually, jointly, and severally, for monetary damages to make Plaintiffs whole, together with interest, expenses, costs of suit, attorney fees, as appropriate, and all such other relief as the Court deems just and proper, including:

1. Full compensatory damages to the Plaintiffs for past, present, and future general damages as allowed by law;

2. Full compensatory damages to the Plaintiffs for past, present, and future

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special damages as allowed by law;

3. Exemplary or punitive damages against Monsanto, Solutia, and/or Pharmacia, under the applicable law of foreign jurisdiction(s); and

4. All other damages allowed by law, rule, or equity.

DATED this 29th day of December, 2017.

FRIEDMAN | RUBIN

By:_____

Sean J. Gamble, WSBA No. 41733
James A. Hertz, WSBA No. 35222
Richard H. Friedman, WSBA No. 30626
Henry G. Jones, WSBA No. 45684

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EXHIBIT A

PCB PRESENTATION

TO

CORPORATE DEVELOPMENT COMMITTEE

I. INTRODUCTION:

We are here today to acquaint you with the PCB (Aroclor) pollution problem and to secure your guidance and approval on a recommended plan of action.

The problem is that Certain PCB's have recently been identified by various scientists along with DDT in fish, birds, and other wildlife.

From the standpoint of reproduction, the PCB's are highly toxic to birds. In a few moments, Elmer Wheeler will describe the problem in detail.

Our objective is to describe for you the basic problems, the issues involved, review alternative courses of action, and suggest an action plan program for your approval.

This is a serious matter, not only from the pollution viewpoint, but also because of the $22 M worldwide customer business involved with resultant gross profits of $10 M and a net investment of approximately $9 M. In addition, there could be possible adverse legal and public relations problems leveled against Monsanto.

Our Agenda will be as follows:

MONS 058730

CV96-3-0440-E
DATE 04/02/01
PLFF EXHIBIT NO. 105

PCB AGENDA REVIEW

I. INTRODUCTION

II. THE PROBLEM
- DEVELOPMENTS INCRIMINATING PCB's
- COMPLEXITY OF IDENTIFICATION
- NATURE OF
- SERIOUSNESS

III. LAW DEPARTMENT VIEWPOINT AND RECOMMENDATIONS

IV. EFFECT ON MONSANTO AND ALTERNATIVES

V. FUNCTIONAL FLUID BUSINESS GROUP DISCUSSION
- MARKETS, USES
- SOURCES OF POLLUTION
- CUSTOMER EFFECT

VI. PLASTICIZER BUSINESS GROUP DISCUSSION
- MARKETS, USES
- SOURCES OF POLLUTION

VII. RECOMMENDED ACTION PLAN

VIII. SUMMARY

S

By way of introduction, the Organic Division and the Medical Department has been actively engaged for the last 18 months in developing facts and knowledge on this subject by personal visits to Universities and Industrial test laboratories, other worldwide producers, and other industrial collaborators, as well as keeping abreast of all literature and news sources on the subject as well as funding a toxicological and analytical test program in excess of $200 M. We established an Ad Hoc Committee of both Business Groups and Medical which recently issued a report - much of which will be discussed today. We have learned a lot, but there is much yet to learn as you will hear.

What are PCB's? They are polychlorinated biphenyls - better known to us as Aroclors. The next slide will quickly re-familiarize you with our Aroclor business.

MONSANTO WORLDWIDE AROCLOR BUSINESS

POUNDS/YEAR	104 M (70 M in Functional Fluids 34 M in Plasticizers)
SALES/YEAR	$22 M ($16 M in Functional Fluids $ 6 M in Plasticizers)
GROSS PROFIT/YEAR	$10.0 M ($7.5 M in Functional Fluids $2.5 M in Plasticizers)
GROSS INVESTMENT	$13 M ($8.8 M net investment)
ROI	10.5%
WORLDWIDE M/I	62%
MONSANTO PRODUCTION LOCATIONS:	USA (2 plants, Anniston, Alabama Sauget, Illinois)
	UK (Newport)
	JAPAN (Yokkaichi)
OTHER PRODUCERS:	Bayer, Prodelec, Caffaro, Flick, Kanegahuchi, and several Eastern European producers (all ex-USA)

Q 4y UK

THE AROCLOR PRODUCT LINE

CHEMICAL NAME	TRADE NAME	NATURE OF MATERIAL
MONOCHLOROBIPHENYL	AROCLOR 1221	THIN LIQUID
DICHLOROBIPHENYL	AROCLOR 1232	
TRICHLOROBIPHENYL	AROCLOR 1242	OILY LIQUID
TETRACHLOROBIPHENYL	AROCLOR 1248	
PENTACHLOROBIPHENYL	AROCLOR 1254	HEAVY MOLASSES
HEXACHLOROBIPHENYL	AROCLOR 1260	THICK TAR
HEPTACHLOROBIPHENYL	AROCLOR 1262	
OCTACHLOROBIPHENYL	AROCLOR 1268	
DECACHLOROBIPHENYL	AROCLOR 1270	SOLID
TERPHENYLS	SANTOWAX	
CHLORINATED TERPHENYL	AROCLOR 5460	SOLID

There are theoretically 210 different isomers of chlorinated biphenyls.

Monsanto entered the Aroclor market in 1930 by acquiring Swan Chemical Company. The first load of Aroclor went out of Anniston, Alabama to General Electric in 1931. Since then, the market has grown to one of Monsanto's most profitable franchises. This franchise is now being threatened not by competition but by recently found pollution problems which Elmer Wheeler will now discuss.

II. The Problem (Wheeler) - see attached Appendix A

III. Law Department Viewpoint and Recommendations (French)

IV. Effect on Monsanto and Our Alternative Courses of Action

As discussed, Aroclors 1254 and 1260 -- the 5 and 6 Cl ringed biphenyls are the ones most seriously involved in the pollution problem. Both Plasticizers and Fluids Groups are involved as shown:

AROCLOR SALES

(M POUNDS)

	FLUIDS	PLASTICIZERS	TOTAL
AROCLOR 1254	1.45	5.4	6.85
AROCLOR 1260 & ABOVE	3.7	1.7	5.4
	5.15	7.1	12.25

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We considered 4 alternative courses of action:

(Slide)

Alternative 1: Do nothing was considered unacceptable from a legal, moral, customer & public relations & company policy viewpoint. This is also the quickest route to being forced out of business.

Alternative 2: Go out of total Aroclor business was considered unacceptable from a Divisional viewpoint, but from a Corporate viewpoint may be necessary. ~~Only you can make that decision.~~ All Aroclor products are not serious pollutants - many degrade; there is too much customer/market need and selfishly too much Monsanto profit to go out. To go out would require a write off of Aroclor net investment of $7 MM (10¢/share) or if biphenyl included $8.8 MM (12¢/share). In addition, inventory disposition, continuing cost of utilities, and back-up capital and serious manpower & resources reallocation at Anniston.

Alternative 3: Go out of Aroclor 1254 and 1260. This was seriously considered and may eventually occur by our actions and customer actions, nevertheless, we feel that segments of this business are defensible or are so "confined" in use that specific plans of action are called for this portion. Our reasons for eliminating this alternative will become clearer as we outline our action plans.

ALTERNATIVE COURSES OF ACTION

1. DO NOTHING - JUST REACT TO LEGISLATION AND EMOTION.
2. GO OUT OF TOTAL AROCLOR BUSINESS.
3. GO OUT OF AROCLOR 1254 AND 1260 PRODUCTION
4. DEVELOP SPECIFIC ACTION PLANS "TAILORED" TO EACH BUSINESS GROUP AND EACH CUSTOMER/MARKET SITUATION TO "CLEAN UP" THE MESS.

S

Alternative 4: Develop specific action plans tailored to each Business Group and each customer/market situation, - was the alternative selected at this point of time and based on our knowledge from a Divisional viewpoint as making Monsanto act in the most positive, responsible way to society and our customers, as well as our interests.

However, because of the magnitude and seriousness of this problem and its total implications for Corporate Monsanto, your plan your guidance and approval is needed. ~~the final decision on this matter must be made by the CPC~~.

V. Functional Fluids Business Group Discussion:

Aroclors are used widely in 3 of our 4 market areas in the Fluids Group:

FLUIDS USE OF AROCLORS BY MARKET AREA

AROCLOR PRODUCT	DOMESTIC MARKET AREA			TOTAL
	INDUSTRIAL	HEAT TRANSFER	ELECTRICAL	
1242	4.1	1.1	36	41.2
1248	1.2	1.0	-	2.2
1254	-	0.1	0.8	0.9
1260 & Above	0.6	-	3.5	4.1
	5.9	2.2	40.3	48.4

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SOURCES OF FLUIDS POLLUTION

APPLICATION	INTENSITY OF POLLUTION	
INDUSTRIAL FLUIDS	GREATEST	(DIRECT)
DIELECTRICS	↓	(INDIRECT CONTAINED)
HEAT TRANSFER	↓	(INDIRECT CONTAINED)
PRODUCING PLANTS	LEAST	(DIRECT)

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FLUIDS CUSTOMER ALTERNATIVES

AREA OF APPLICATION	PRODUCT OF CHOICE	CUSTOMER OPTIONS
Industrial Fluids	Pydraul 312/F-9/ A-200/Phosphate Esters/ Water Glycol	Customer could get along without us, but Pydraul 312 favored. H_2O Glycol has some pollution problems. Phosphate ester route ok at present.
Transformer	Air/Oil/Aroclor/Gas	Could drop Aroclor at sacrifice of safety, cost or size of equipment or noise level.
Capacitors	Aroclors	No immediate replacement available. Longer term - oil at expense of size and cost of efficiency and redesign of equipment.
Heat Transfer	Therminol	No option for FR liquid market. Other system possibility.
	Oil/Dowtherm/T66 T55 T77 T88	Liquid systems favored. T66 and T55 increasing rapidly in use. Oil also a pollution problem.

Customer Choices & Alternatives & Penalties:

Summarizing, some of our customers have no immediate alternative, some could change only at sacrifices of safety, or cost or various technical factors. Only in the Industrial field could the customer make an immediate conversion.

PCB Threat to Functional Fluids Business and Profit:

FLUIDS BUSINESS THREATENED

(1970 BUDGET)

PROBLEM	SALES	GROSS PROFIT
1. Confined to A-1254/ 1260 only.	$ 3.0 M	$1.36 M
2. Spreads to A-1242 and 1248		
First to: a) Industrial Fluids	$ 4.0 M	$1.6 M
Then to: b) Dielectric Fluids	$ 8.0 M	$3.8 M
Then to: c) Heat Transfer	$ 1.0 M	$ .6 M
	$16.0 M	$7.36 M

— Turn over to Jim Flannigan

15 +1

VI

PLASTICIZERS (WORLD-WIDE)

	ALL AROCLORS	AROCLOR 1254/1260 TYPE
1969 SALES, DOLLARS	$ 6.0 M	$1.7 M (28%)
POUNDS	34.0 M	9.5 M (28%)
1969 GROSS PROFIT	$ 2.5 M	$0.8 M (32%)

COMMENTS: DISTINCTIONS FROM F.P.

1. Large number of direct U.S. customers - 570.
2. Customers are small: 23 direct customers - 47% A-1254/1260 sales.
3. 50% domestic A-1254/1260 sales through distributors - difficult to police.

MARKETS	1968 SALES	MAJOR AROCLOR USED
Carbonless Carbon Paper	8.8 M lb.	Aroclor 1242
Hot Melt Adhesives	5.7 M lb.	Aroclor 5460
Swimming Pool Paints	1.7 M lb.	Aroclor 1254) Aroclor 5460)
Protective Coatings	5.3 M lb.	Aroclor 1254) Aroclor 5460)
Emulsion Adhesives	1.5 M lb.	[illegible] Aroclor 1260)
Sealants	3.0 M lb.	Aroclor 1254) Aroclor [illegible])
Wax Modification	2.0 M lb.	Aroclor [illegible] Aroclor 5460)
Miscellaneous	5.0 M lb.	Aroclor [illegible]) Aroclor 1254)

COMMENTS: 1. [illegible] major customer (85% of Aroclor 1242 sold .

2. [illegible] of domestic Aroclors sold through [illegible] distributors.

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POSSIBLE CONTAMINATION SOURCES

(PLASTICIZERS)

DEGREE OF CONTAMINATION	MARKET	APPLICATION	SOURCE	IS A-1254 /1260 USED?
Most	Coatings	Marine Paints) Water tank linings)	Leaching	Yes
	Coatings	Swimming Pool Paints	Leaching	Yes
	Carbonless Carbon Paper	-	Vaporization	No
	Wax Modification	-	Vaporization	Yes
	Emulsion Adhesives	-	Contact with product via packaging. Incineration.	Yes
	Hot Melt Adhesives	-	Contact with product via packaging. Incineration.	No
Least	Sealants	Automotive Construction joint sealants	Long-term leaching	Yes

COMMENTS:

1. Unlike fluids, Aroclor plasticizers are combined into plastics to produce the final product - therefore, far less mobile.
2. Problems such as wastes from our manufacturing plants, customers plants and and leasing of drums common to both groups.
3. Exterior protective coatings are not considered a high potential source.
4. Volatilization of Aroclors during plant processing or [illegible] product. Rain will wash vapors back to earth.

PLASTICIZER BUSINESS THREATENED

PROBLEM	SALES RETAINED*	$ G.P. RETAINED (LOST)
1. Confined to A-1254/1260 type only.	$4.3 M	$1.7 M (-$0.8 M)
2. Spreads to all chlorinated biphenyls.	$2.0	$0.6 M (-$1.9 M)
3. Spreads to all PCB's and all chlorinated terphenyls	0.0	0.0 (-$2.5 M)

*Based on 1965 prospects.

COMMENTS: Plasticizers sell Aroclor 1262/4465 which are very close to A-1254/1260 and these have been included as A-1254/1260.

RECOMMENDED ACTION PLAN

THE JOINT ACTION PLAN DEVELOPED BY THE FUNCTIONAL FLUIDS AND PLASTICIZER BUSINESS GROUPS, AND THE MEDICAL AND LAW DEPARTMENTS IS AS FOLLOWS:

1. Appoint a Project Manager - responsible for the overall management of the Aroclor pollution problem. He would be assisted by a Task Force from members of each Business Group plus Medical, Law, Engineering and Manufacturing.

2. Notify all Aroclor customers of PCB problem and relabel containers - within 60 days.

3. Clean up Monsanto plants' effluents within 12 months.

4. Develop and implement new packaging systems for Aroclor 1254/1260 - within 6 months.

5. Educate customers on need for clean-up at their plants - within 4 months.

6. Introduct to market, replacement products for Aroclor 1254/1260 - beginning 1/1/70 (Fluids), 4/1/70 (Plasticizers).

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RECOMMENDED ACTION PLAN

7. Continue and expand biodegratation test program with Aroclor series, particularly 1242, 1248 and 1254.

8. Continue toxicological test program.

9. Accelerate present analytical test program.

10. Determine feasibility and cost of eliminating 5/6 Cl_2 in Aroclors 1242 and 1248. (3/70)

11. Study incineration products. (3/70)

12. Develop business plan to offer:

    Monsanto Fluid Reclamation and Recovery with Enviro Chem (4/70). (Reclamation already underway at Findett.)

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WHAT COULD WE EXPECT FROM THIS PROGRAM?

Through this action program, Monsanto would expect to:

1. Retain or convert a good portion of our business and profits:

PROBLEMS	CONVERT OR RETAIN	$M SALES OUT OF PRESENT	ODDS OF SUCCESS
a. Confined to A-1254/ 1260.	$20.3 M	$22 M	70%
b. Spreads to A-1248 and 1242.	$10 M	$22 M	60%

2. Gain further valuable knowledge and time to:
   a. Learn more facts.
   b. Protect our position.
   c. Make further decisions regarding our program.
   d. Contribute to overall pollution knowledge.

3. Clean-up the major contributing PCB pollution factors.

4. Minimize customer complaints and hardships.

-2-
4 25

The Program Would:

1. Cost some money.

   Est. SARE - $400-500 M

   Est. Capital - $700 M

   $1.1 M - 1.2 M

2. Expose us to continued adverse publicity and possible law suits.

3. Cause some customer discontent - but much less than an abrupt termination of production.

EXHIBIT B

October 11, 1937.

"Experimental work in animals shows that prolonged exposure to Aroclor vapors evolved at high temperatures or by repeated oral ingestion will lead to systemic toxic effects.

Repeated bodily contact with the liquid Aroclors may lead to an acne-form skin eruption.

Suitable draft ventilation to control the vapors evolved at elevated temperatures, as well as protection by suitable garments from extensive bodily contact with the liquid Aroclors, should prevent any untoward effect."

In talking with Dr. Kelly before these three paragraphs were written, we agreed that they might as well be phrased so that they could be used not only in the Aroclor booklet, but quoted in correspondence as that may be necessary.

L.A. Watt

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Attachment 3-2

3.2

EXHIBIT C

COPY

Dr. D.V.N. Hardy
Dr. H.R. Newman.

Monsanto Chemical Company

St. Louis, Missouri

September 20, 1955

Dr. J.W. Barrett

London

Your memo September 8 to Mr. Nason

AROCLOR TOXICITY

Howard Nason has given me your memo of September 8. I will be happy to discuss this with Dr. Newman during his visit here. I think, however, there are several points that I can answer you now.

You comment upon the difference in toxicity between Aroclor 1254 and 1242. This is not particularly surprising because in the earlier work it was found that toxicity increased with chlorination. Of course, from the standpoint of volatility in the case of inhalation or absorption from the gut from the point of view of ingestion are important. Frankly, there was not too great a difference between the two compounds, however. As you know, the maximum allowable concentrate is 0.1 ml/cubic meter in the case of 1254, and as high as 10.0 mgm in the case of 1268. I think the former is too low and the latter is too high. In this country they don't use the MACs very routinely, but certainly in England I think it would be alright to consider 0.2 mgm/cubic meter as perfectly safe.

I don't know how you would get any particular advantage in doing more work. What is it that you want to prove? I believe your work should be directed towards finding out what the concentrations are of Aroclor during different operations whether it is industrial or painting. The reports you have seen from Kettering Laboratory are the result of approximately $15,000 to $20,000 expenditure by MCC.

MCC's position can be summarized in this fashion. We know Aroclors are toxic but the actual limit has not been precisely defined. It does not make too much difference, it seems to me, because our main worry is what will happen if an individual developes any type of liver disease and gives a history of Aroclor exposure. I am sure the juries would not pay a great deal of attention to MACs.

COPY

We, therefore, review every new Aroclor use from this point of view. If it is an industrial application where we can get air concentrations and have some reasonable expectation that the air concentrations will stay the same, we are much more liberal in the use of Aroclor. If, however, it is distributed to householders where it can be used in almost any shape and form and we are never able to know how much of the concentration they are exposed to, we are much more strict. No amount of toxicity testing will obviate this last dilemma and therefore I do not believe any more testing would be justified.

Let's see what our discussions with Dr. Newman and yourself bring out.

R. Emmet Kelly, M.D.

REK:k

EXHIBIT D

From MONSANTO CHEMICAL COMPANY

At St. Louis

cc Mr. J. Cresce -Krumm. Plt
Mr. E. W. Lieben -" "
Mr. R. M. Webber -" "

CONFIDENTIAL Date November 14, 1955

To Mr. H. B. Patrick Reference

At Krummrich Plant Subject DEPARTMENT 246 (AROCLORS)

It is the opinion of the Medical Department that the eating of lunches should not be allowed in this department for a number of reasons.

(1) Aroclor vapors and other process vapors could contaminate the lunches unless they were properly protected.

(2) When working with this material, the chance of contaminating hands and subsequently contaminating the food is a definite possiblity.

(3) It has long been the opinion of the Medical Department that eating in process departments is a potentially hazardous procedure that could lead to serious difficulties. While the Aroclors are not particularly hazardous from our own experience, this is a difficult problem to define because early literature work claimed that chlorinated biphenyls were quite toxic materials by ingestion or inhalation. In any case where a workman claimed physical harm from any contaminated food, it would be extremely difficult on the basis of past literature reports to counter such claims.

Jack T. Garrett

Jack T. Garrett

JTG:SMB

PLAINTIFF'S EXHIBIT 4403

PENGAD-Bayonne,NJ

[illegible] IN 10

EXHIBIT E

St. Louis, Missouri

January 21, 1957

Messrs.:
C. R. Buchanan - Robts.
R. E. Hatton - N.C.
F. H. Langenfeld-Robts.
H. E. Litzsinger-Robts.
C. R. Sido-Washington,D.

Mr. H. I. Armstrong

Roberts Building

FYDRAUL 150

Dr. Treon and I spent an afternoon with the Navy people to discuss Fydraul 150. Those present were Captain Shone, Captain Alvis, Captain Seaborne, Commander Siegel and Mr. Mickey Albert. They discussed their information concerning Fydraul 150 which was obtained at the Naval Institute of Medical Research. While reports were not available, they had the following general data:

Skin applications of Fydraul 150 caused death in all of the rabbits tested. (The amount administered was not given.) A like amount of Cellulube 220 did not cause any deaths.

The inhalation of 10 milligrams of Fydraul 150 per cubic meter or approximately 2 tenths of a part of the Aroclor component per million for 24 hours a day for 50 days caused, statistically, definite liver damage. No matter how we discussed the situation, it was impossible to change their thinking that Fydraul 150 is just too toxic for use in a submarine. It may be that such concentrations would never be reached in the submarine but the Navy does not appear willing to even put the material in a trial run to see if it will work.

It would appear, therefore, that we should discontinue to sell Fydraul 150 for this particular application and try to develop a hydraulic fluid without Aroclor as one of its components. In this connection, Cellulube 220 is not used in a submarine but it was used in this test merely as a yardstick.

The Navy said they did not have any competitive fluid far enough along engineering-wise to even consider the toxicity of it.

R. Emmet Kelly, M.D.

REK:SHH

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PLAINTIFF'S EXHIBIT 5403

ALL-STATE LEGAL

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EXHIBIT F

bcc: R. E. Keller - QUEENY

February 27, 1967

Dr. M. J. Thomas
Research Division
Building No. 33
National Cash Register
Dayton 9, Ohio

Dear Dr. Thomas:

Attached is a photostat of the original paper of Dr. Jensen in Sweden, relating to polychlorinated biphenyls. I will be happy to have your ideas after you read it.

As far as the section on toxicology is concerned, it is true that chloracne and liver trouble can result from large doses. Whether or not this is at all relevant to small quantities existing in human fat is, of course, an entirely different question.

At any rate, I believe before we worry about the toxicological part of the problem, we should settle the analytical part.

Sincerely,

R. Emmet Kelly, M. D.
Medical Director

REK/ln
att.

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Mr Chairman, Ladies and gentlemen.
In honor to our Brittish guest I will try to hold this lecture in English.

As the title of this lecture states, I am today going to tell about the discovery of some hitherto unobserved chlorinated hydrocarbons having up to eight chlorine in the molecule and found in residue analysis. The chemical name of polychlorinated bifenyls (In the following called PCB). To get familiar with PCB I will start with the chemistry and toxicologi.

Chemistry

Th

The main characteristic of PCB is 1. Their very high stability. As an example they can be boiled with nitrin acid without being destroyed. 2. They are hardly metabolised in living organism. 3. if more than 4 chlorine are present they are non inflamable. It is clear that these three characteristics does it easy to understand that when they have entered the living organism the will have a low persistence . But it is difficult to explain how they find their way into the living organism. One thing seems to be clear, they don't come from agricultural use, but from a technical one and most probable it comes to the nature via wastes that are tried to be burnt up, because then we have them at once in the air, because of their non inflamability.

Toxicologi

The PCB were introduced in 1929 and as early as 1936 Jones and Aldon reported that 23 out of 24 men employed in manufacturing of PCB suffered from an acne form eruption of the skin. Acne did not appear until 6 to 8 months after the material was first used. In 1937 Drinker reported that rats exposed to chlorinated biphenyls in concentration of approximately 1 mg/m^3 for 16 hours a day for 6 weeks showed damage of the livor. After that time the allowed concentration of PCB in air is 0,5 mg/m^3. (For DDt the same value is 0.5 - 1 mg/m^3). The same authors finished their experiments in 1938, and related that these compounds have an injourious effect, manifested solely in the liver. Chlorinated bipohnyls appeared to be the most injourious chlorinated compounds of all tested.

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Greenburg, Mayer and Smith 1939 reported that PCB and polychlorinated naphtalenes are blamed for the death of three young workers, and that pregnant women and persons who have at any time had any liver diseases are particularly suspectible.
Wedel, Haller and Benton gave 1942 animals PCB including administration by inhalation, ingestion and skin absorbtion. Histological examination of the viscera showed important toxic effect only in the skin and liver, and the degeneration effects in the liver are essentially the same whatever was the method for the administration. Faribok (1955/ found as an occupational poison in the electrical industry, mixed tetra and penta chlorobiphenyl causes folliculitis, comedo, pyodermia and other skin affections, and that its principal toxic effect is fatty degeneration of the liver.
Miller (1944) injected 69 mg PCB (4 and 5 chlorine) subcontaneously in 32 guinea pigs. Eight to ten days after injection, fat droplets were noted in the liver cells, and after 16 days they were present in moderate or very large numbers. Rabbits and rats were also tested in this investigation, as well as the PCB was administated both continously, subcuntinously or ingested in the food. In the feeding experiment 8 guinea pigs received 2 doses of 69 mg of the chlorinated biphenyl 1 week apart. Death occurred in 11 to 29 days.
Finally Mc Laughlin 1964 reported a method to test the chemical toxicity and teratogenic effect by injection into the yolk sac of fertile eggs prior to incubation. PCB was found between the eight compounds among 100 tested having the highest order of toxicity. No hatch was found at a level of 25 mg pr egg. At a level of 10 mg per egg, one chick hatched out of 20 injected eggs, but died 2 days later. Some embryos which were examined after they died, showed weak deformities (often a short upper brak) and growth retardation. Lead acetate resulted as an example in no hatch at a level of 1 mg per egg. Autopsy of the dead embyos have showed extensive brain damage. Mercuric chloride showed no hatch even at a level of 0,5 mg per egg.

As the analytical chemistry is a pronounced service science I have been in contact with many scientists from other fields during the work with residue analysis, and I have always found this contact very stimulating for my own work. This co-operation often demands that we are talking the same scientific language. Because of this need I will today try to give a lecture in low level analytical chemistry for biologists, illustrated by the residue analysis of polychlorinated biphenyls.
The lecture will be divided in the following three sub-divisions:

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1. Chemistry of PCB and their toxicology.
2. Analytical methods for residue analysis and proof of structures.
3. Behaviour of PCB in nature, differencies in metabolising rate of the PCB components, potensation in an ecological serie, concentration levels and examples of samples which have been proved to contain PCB.

A residue analysis can be divided in:

1. Extraction of the pesticides from the biological material, followed by a careful cleaning-up to take away interferring substances, most often fats.
2. Identification analysis by mean of gas chromatography. Thin-layer chromatography and mass spectrometry.
3. Quantitative analysis.

At an ecological laboratory in Riksmuséet in Stockholm 1-2 g of a sample is cut out of the biological material and transferred into a weighed and carefully cleaned test tube, and stored at -20° until analysis. Smaller samples have been used, min. 5 mg of body fat, and with dry materials such as hair, feathers, pine needles 100 mg are sufficient to reach the desired 10 ng/g level in residue analysis. In cases of water proofs 1 l. is used for reaching the 10 pg/g. level.

B.1(homog) In order to facilitate complete extraction of the fatty materials from the biological sample, the doulbe amount of finely powdered anhydrous magnesium sulphate is added to the sampling tube, and the whole is homogenised with an insertable homogenizer. The resulting powder is transferred into a special Soxhlet extractor. After 4 hours of extraction the solvent is evaporated, leaving the fat in a small weighed test tube at the bottom
Sox.-tube) of the extractor. This fat is dissolved in methylene chloride in such a way that 100 ul (0,1 ml) contain 20 mg of fat.

The 100 ul solution is now transferred to a little object glass, 3 x 7 cm, covered with a silicagel layer 1 mm thick, in order to form a line 0,7 cm from one end of the slide. Inserting this thin-layer plate into a vessel the bottom of which is covered by a few mm of methylene chloride, the solvent will be sucked up in the dry layer of silicagel, and at least reach the upper end of the plate. The fact is that the fat has a greater affinity to the powder on the plate than the chlorinated hydrocarbons have. — and we get a separation. The fat being more polar than the chlorinated hydrocarbons will never go longer than 2 cm before the

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solvent reaches the upper part of the glass.

elution tube

The front of the fat appears quite visible against a lamp, and with the aid of a razor blade the zone above the fat is transferred to the elution tube and the chlorinated biocides absorbed on the powder can now be eluted by one ml of ether. The concentration is sufficient for detection of the chlorinated hydrocarbons down to the 10^{-12} g level.

5 ge

The next step in the analytical procedure concerns the separation of the different chlorinated hydrocarbons that the sample may contain. As a matter of fact, this is a troublesome task. It is easy to estimate what is not present, but more difficult to say exactly one is present. We suffer from the negative demonstration, as will be shown later.

At first a few words about the separation of the components present in the sample and their visualization.

6 ge

The separation is accomplished by mean of a gas chromatograph fitted to a detector that transfers its impulse to a recorder.

The system is shortly described:

A spirally formed glass tube with an inner diameter of 2 mm and about 2 m in length is filled up by a support, covered with an thin layer of an oil. The tube is heated in the chromatograph to about 200°. Through the tube a stream of nitrogen continously follows. When about 10 ul (1/100 of 1 ml) of the purified sample is injected into the tube, the components of the sample will be evaporized and go forward through the column with the gas stream. As the constituents have different affinity to the column filling they will pass the column with different speed and it will take different time for them to reach the detector at the other end of the glass tube. If the temperature and the nitrogen flow are held constant this time, the retention time, has a specific value for a certain compound. This is true, but unfortunately it is also a fact that two components can have the same retention time. This is one of the bigger problems in gas chromatographic analysis of unknown samples, as will soon be obvious.

To make it possible to estimate the retention time it is necessary to visualise the chlorinated hydrocarbons. For that purpose more or less specific detectors are used. The detector most often used in posticide analysis is the so called electron capture detector, which can detect down to one picogram (= 10^{-12} g of lindan). Unfortunately this detector is not specific for chlorine, bu gives answer also for oxygencontaining compounds. The response here is much lower but can be counterbalanced if the consentration of the oxygen containing is much higher. 0281423

The principle for the electron capture detector is shortly:

At the end of the gas chromatographic tube is placed a little tube containing a foil made of titanium tritide. This is an radiant. The p-

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particles are reacting with the nitrogen molecules coming from the column. Then we get $+ N_2 \rightarrow e^- + N_2^+$. Over the detector we have a tension of 90 volt and by mean of the electrons we will get a constant electrical current over the detector. This standing current is transferred to a one-mV recorder as a constant baseline. When now a chlorinated hydrocarbon leaves the column this compound has a high affinity to the electrons and this means that the amount of electrons will diminish, and they will diminish proportionally to the amount of chlorine. The electrical current will also diminish and this is noted as a peak on the recorder. The area of the peak will be proportional to the amount of substance in the sample. By mean of a standard injection it is now possible to compare the retention time and the area of an unknown component with the retention time and area of the known standard. As said before this detector is not specific for chlrine but anyhow very useful, because of its high sensitivity. The system described has, as we have seen, two disadvantages:

1. Two different compounds can have the same retention time and be detected as one peak.
2. A registrated peak does not need to be chlorinated , because the detector is not specific.

If the sample is injected in two different columns with different chemical properties we have increased the chance for a good separation. If two compounds have the same retention time on one column they may not have it on another. When a result seems doubtful, - if the compound being responsible for a certain peak contains chlorine or not - it is possible to concentrate the sample and analyse it on a less sensitive detector such as the microcloumetric one, which is specific for chlorine. The compound is burned in a furnace and teh generated chlorine titrated directly.

As is seen from the two last mentioned possibilities it is anyhow possible to get a rather high degree of certainty in residue analysis, but it is a rather time-consumeing work.When using this method just described, we very often found that many chromatograms from residue analysis of most carefully purified samples still contain a large number of peaks. Many of these have retention times that do not agree with any known chlorinated pesticides, or their metabolites. This chromatogram con serve as an example. It was obtained by residue analysis of a sea-eagle found dead in the archipelago of Stockholm. In the range of the known peaks, there are so many unidentified that there also must be an obvious risk of the known peaks to be covered by unknown ones.

If this remark is found true, the reported results of many previous quan-

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titative analysis must be brought into question. In the present investigation it is shown that most of the unknown peak of chromatograms at residue analysis of chlorinated pesticides are due to polychlorinated biphenyls.

I will show a chromatogram of human fat analysed on a so called SF 96 column, the most often used type in pesticide analyses. Early retention times were in agreement with DDE, DDTop and DDTpp. Next slide shows the same sample analysed on a QF-1 column. Now the former 2 DDT peaks have divided into 4 peaks, and two of them are still in agreement with DDTpp and op., the two new were unknown.

Logically, these unknown components were at first thought to be metabolites of the insecticides. Against that spoke that neigther treatment nor concentrated sulfuric acid in other. This treatment made it rather sure that the compounds did not contain oxygen. In Sweden residues of organic mercury have been investigated rather intensively in the Swedish fauna. As these compounds give very high responses to the electron capture detector it was also investigated if the unknown peaks could have a mercuric origin.

It was found that the water-ecological series had high residues of both mercury (Westermark, Johnels) and the unknown ones, when the same individuals were analysed. Anyhow, the pheasant suffering most from mercury poisoning only contained low levels of electron capturing compounds and these belonged to the normal insectisides. Therefore the unknown could hardly be mercurials or metabolites of them.

As the eagle sample giving the chromatogram shown in fig. 10. could be estimated to contain DDT and DDE up to 13 g/kg in extractable fat, the amount of unknown compounds also were suggested to be in the same range, and tehn sufficiently high to do a run on the combined gas chromatograph – mass spectrometer. If this could be done successfully it would be possible to get very important informations about the chemical nature of the unknown, for ex. the molekular weight numbers of chlorine etc. This method is up to now the method giving the highest degree of certainty in the low level analytical chemistry, amounts of 100 ng substance being enough.

As this method for identification of totally unknown residues surely will be very important in the future (when f.ex. a biologist has found that fishes in a river die) it may be possible by mean of this method to find out exactly what compounds are responsible for the death. For this reason, I will go into some details with this method. In the actual case we took the extract from 20 mg eagle and concentrated

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it as much as possible and made an injection on the gas chromatograph combined with the mass spectrometer. The result was the chromatogram shown on the next slide. Every time the recorder showed that a compound is leaving the column, the effluent is led to the mass spectrometer. Now just a few words about the mass spec.

The molecules leaving the column are bomded with electrons at E. We have now got the molecule positive charged, but with the same mass as before. This M^+ is accelerated in a vacuum and will then get a kinetic energi. where is the speed. Next comes the magnetic field that tries to bend the direction of the molecule. This will be big for a small molecule and less for

If we have a sieve in the other end we can directly read the molecular weight. Added to this parent molecule M^+ we will also get addition informations, because of the fact that M^+ may not be stbble, a part of them will be broken down before they reach the sieve in the other end.

F.ex. M^+_{DDT} $M^+_{DDT} - CCl_3$

Mass spectrograms from the different unknown peaks in the eagle sample as shown. The mass numbers equal to the molecular weights or the unknowns could be read to 426, 392, 358, 324. Astonishingly, the molecular differences were constantly 34 mass units. This difference shows a familarity in origin of the unknown. Now the fact is that chlorine exsists as a mixture of two isotopes with atom weights 35 and 37 in proportion 75:25. If the molecule has one chlorine, this will give two molecule peaks, one for Cl_{35} and one for Cl_{37}. If there are two chlorine we have the possibility of one with only Cl_{35}, one with both Cl_{35} and 37 and one with 2 Cl_{37} and therefore

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The relation of the peaks found on the different mass spec were:

Molecular weight	324	358	392	426
Chlorine content	5	6	7	8

An explanation of the familiarity of the compounds can be given if one substance is built from the former by substituting a hydrogen with chlorine

$$RH \quad M^+ + Cl_2 \qquad RCl \quad M^+ + 34 + HCl$$

Then it is possibl to calculate the molecular weight of the parent hydrocarbon PHC.

$M_{PHC} = M - x\,M_{Cl} + x\,M_H$, where M is the molecular weight of the component having x chlorine atoms. F.ex. for m = 426 and 8 Cl we will get M_{PHC} = 426 - 280 + 8 = 154 and equal with the other molekyls.

The most probable formula with carbon and hydrogen giving this molecular weight is $C_{12}H_{10}$ and this can only be satisfied when the parent-hydrocarbon is biphenyl, and the unknown being polychlorinated biphenyls. This explanation was later fully verified by injection of a synthetic PBC on the mass spec.

Furthermore extensive gas chromatographic investigations proved that the PBC standard gave peaks with the same retention time as the unknown peaks from the sea eagle.

With the method just described I suppose that we have a new possibility to study the residues in the air because the pine needles can allways be

. We have had great difficult: in quantifying the PCB, but when getting a little more time it will be possible. We have done a few calculations on a few species, and I suppose they are right within a factor 2. We have found the residue to be from

It has been my statement here to-day to present this method for studies of defiling of the nature, and with this method a new type of defiling agents has been found to be present in nature, and a few experiment have shown where they may be found.

Now this method is going to be used in the first hadn to estimate how the situation is in nature as a whole, and in the other hand to find the leaks throug which they find its way to nature. Some maybe are present here today to get news about the leaks, and to them I want to say come back in a year.

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So much I think I can say again that the PCB hardly can come from agriculture. As support for this suggestion I can say that we have found PCB in eagle feathers from Riksmuseet from 1944, where hardly any chlorinated pesticides were used in agricultrue. One more thing that I find important to say is that in contrast to the mercury problem this does not seem to be a pure Swedish problem. I have just studied chromatograms taken from London air, and they clearly contain PCB, and dr. Holden has told me that he also find them in his fishsamples. But finally in waiting at more results I should like to point out one morething. It is proved that PCB comes to nature, we dont know now where they are used, but they are very persistant to chemicals and to fire. I think the poison jury should try to state that a content of PCB shall always be found in an open declaration.

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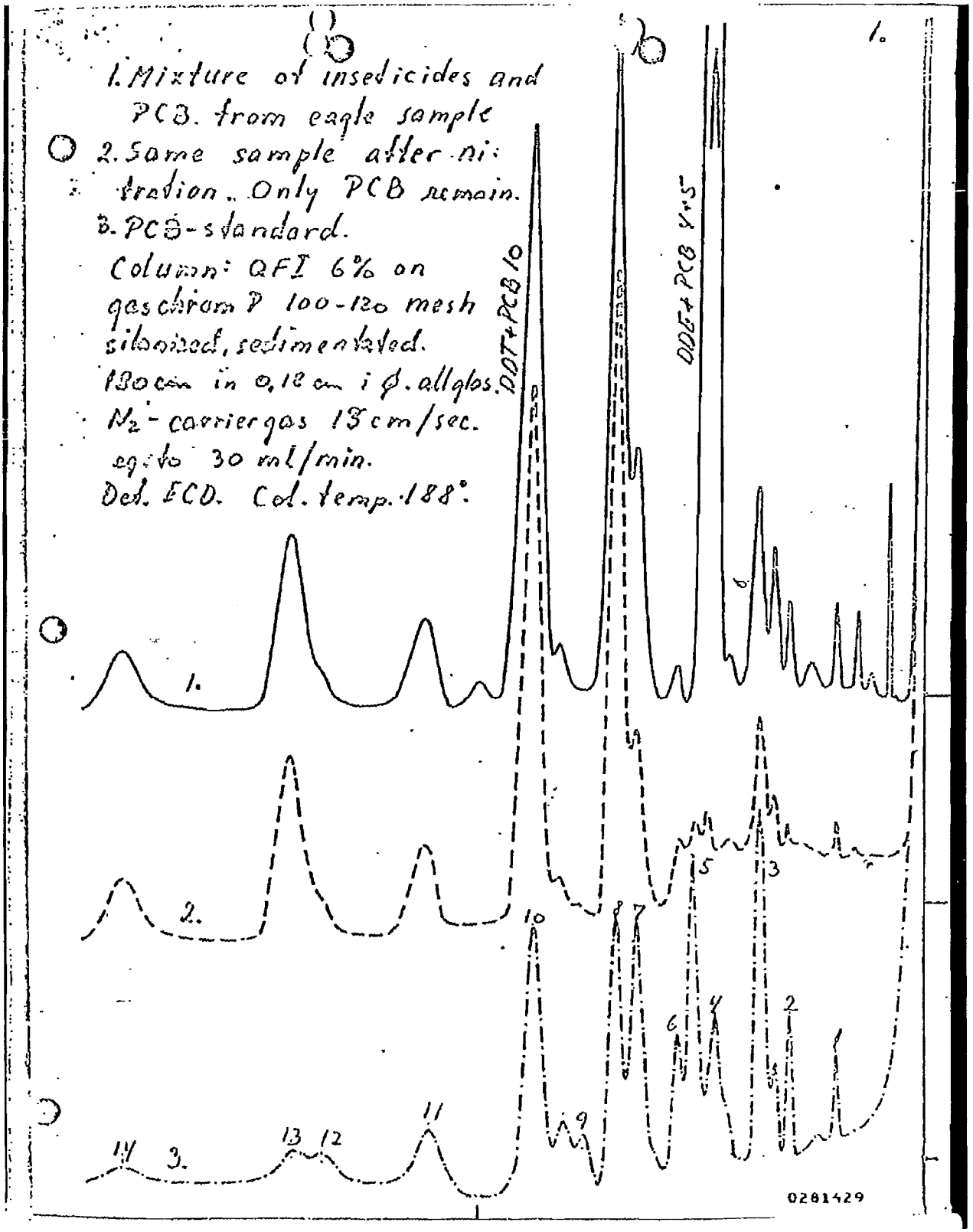

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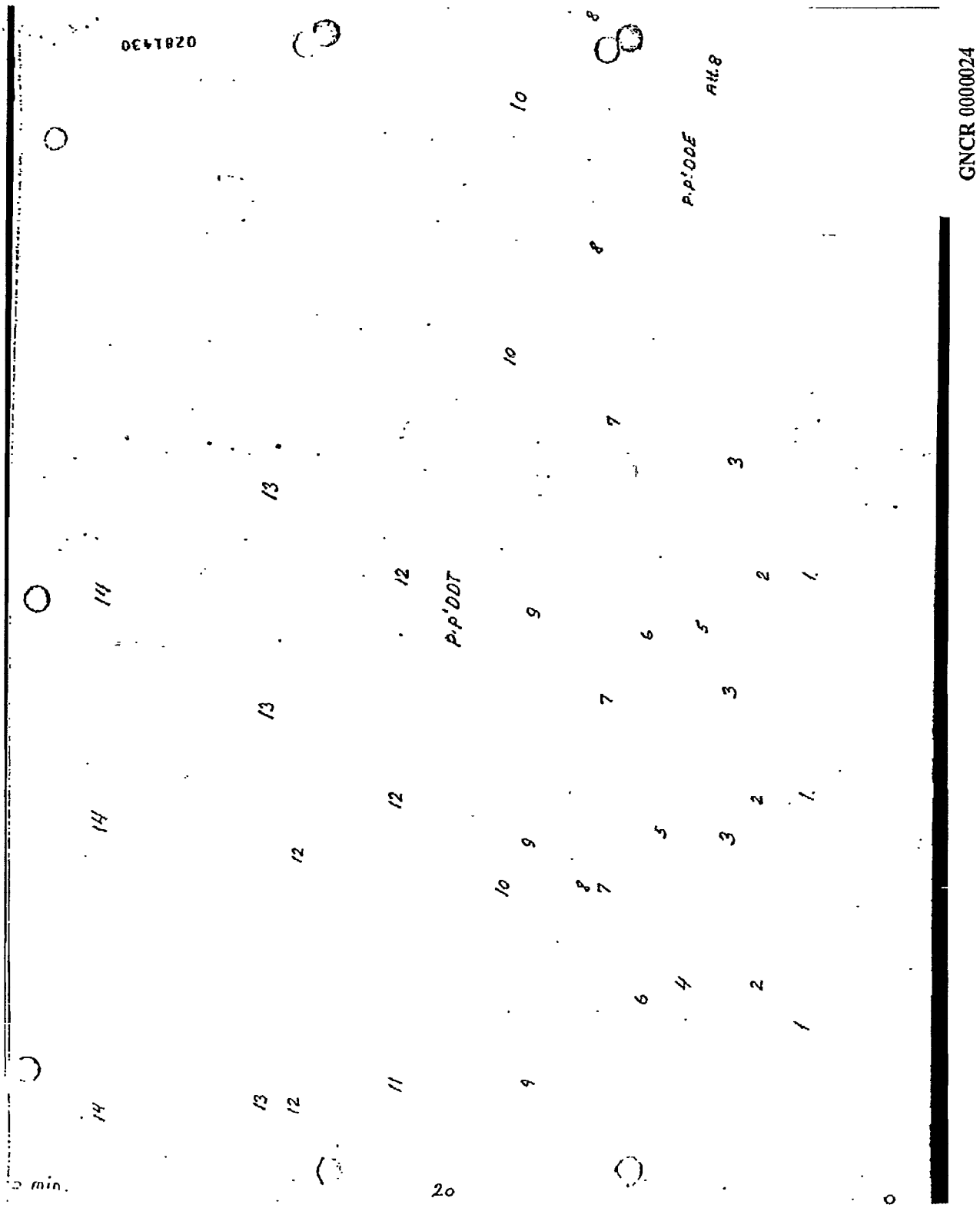
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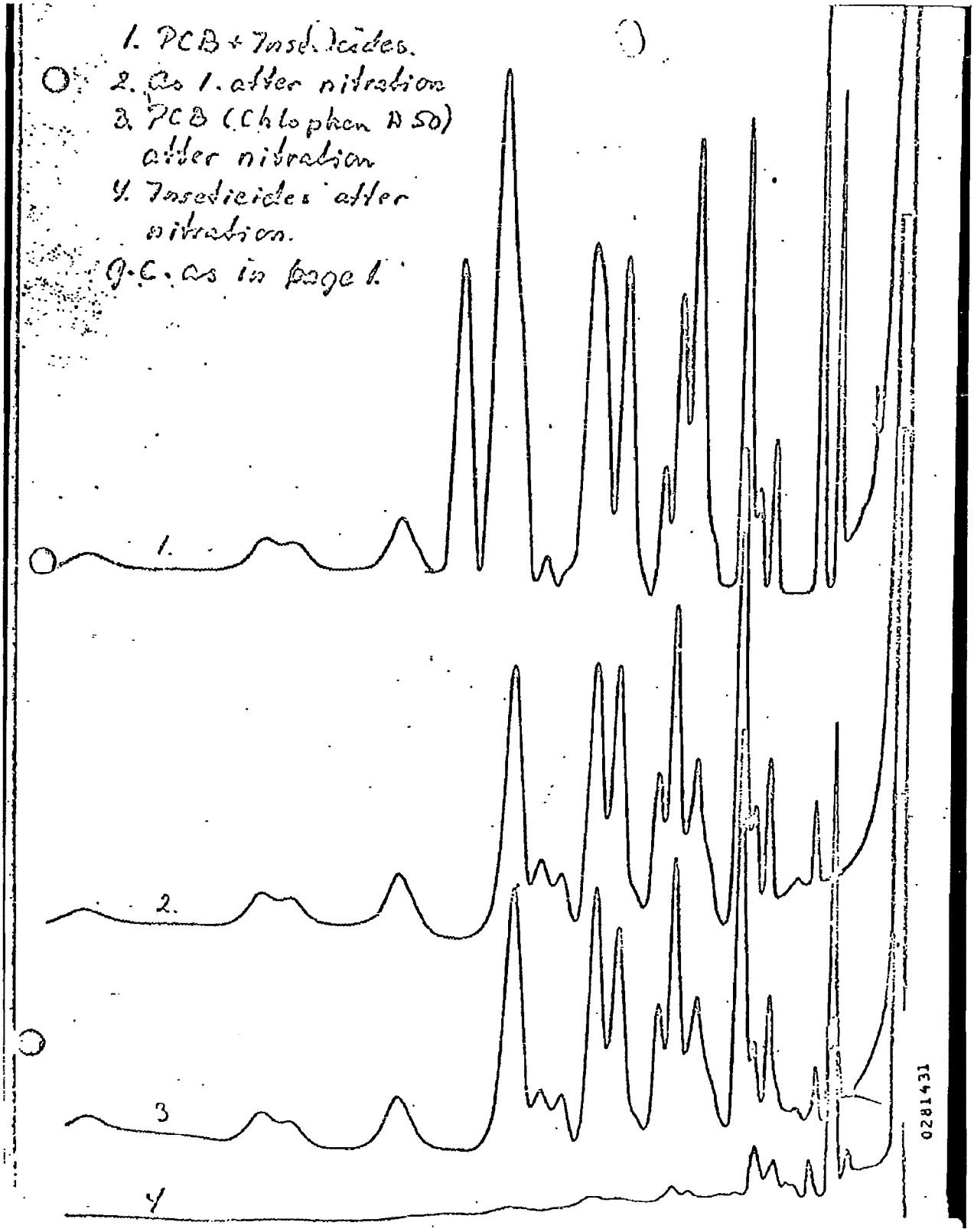
Alt.8
P,P'DDT
min.



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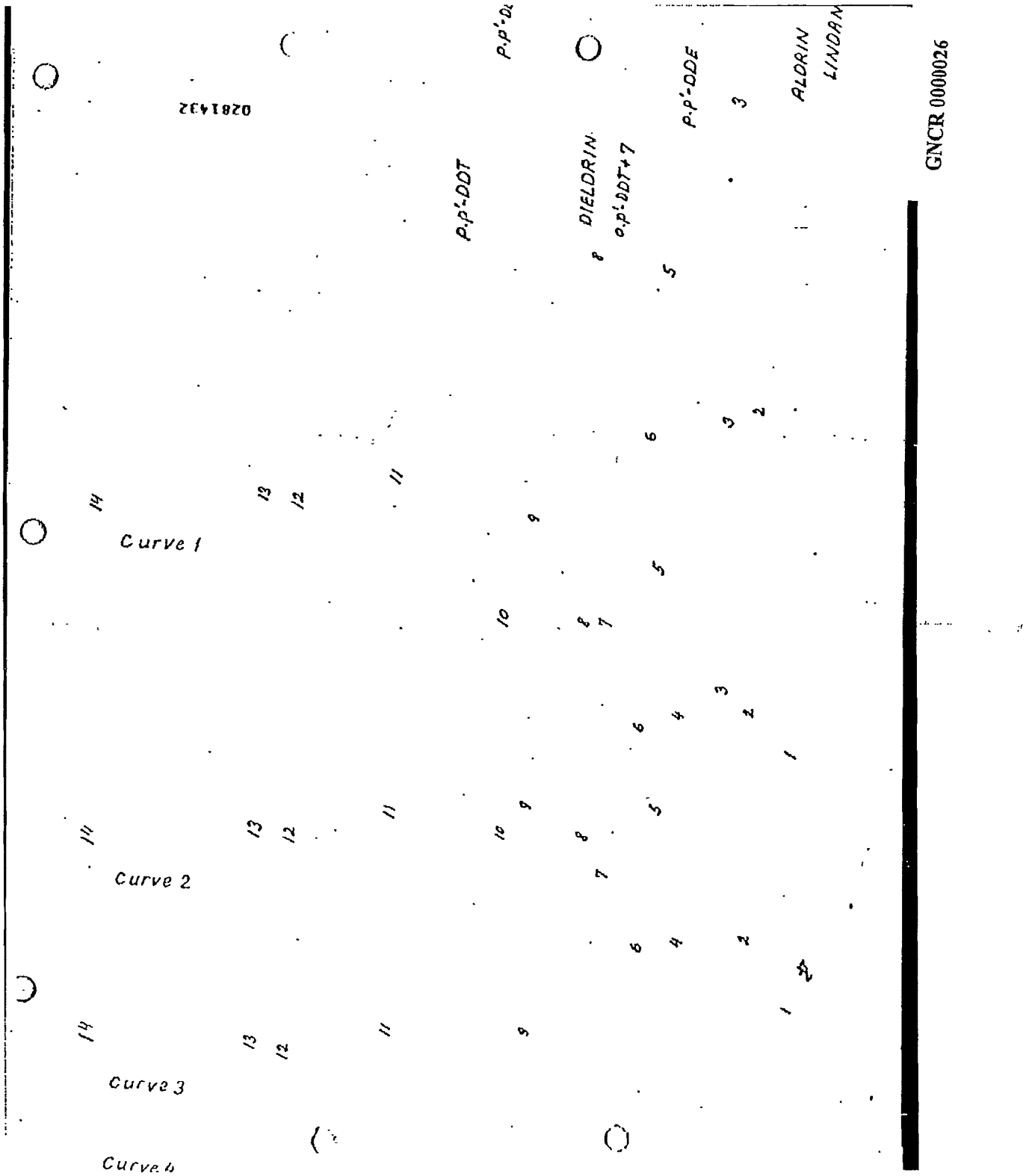
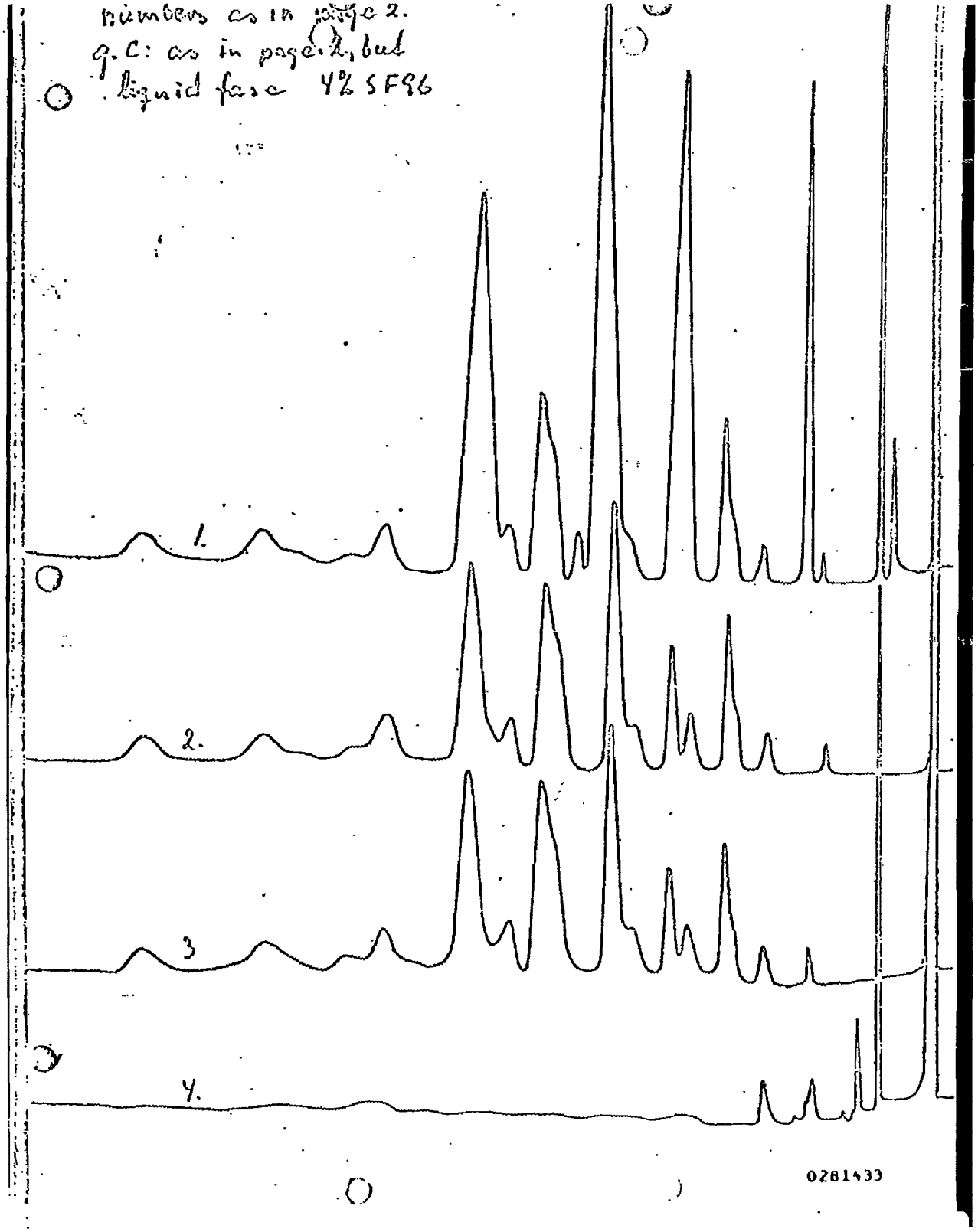

0281432
P,P'-DDT
DIELDRIN
o,p'-DDT+7
P,P'-DDE
ALDRIN
LINDAN
GNCR 0000026
Curve 1
Curve 2
Curve 3
Curve 4



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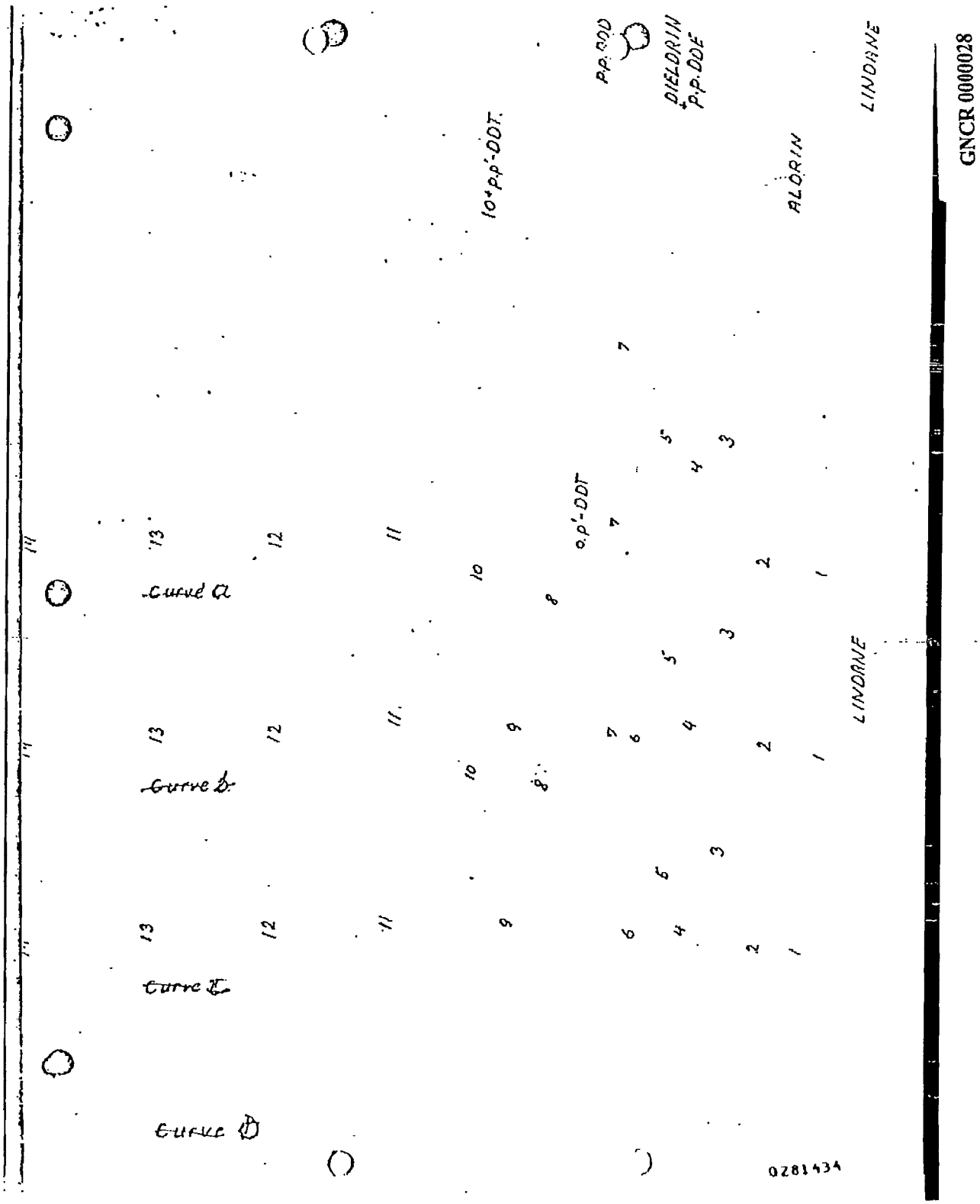
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LINDANE
ALDRIN
DIELDRIN
p,p'-DDE
p,p'-DDD
10 p,p'-DDT
o,p'-DDT
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Curve A
Curve B
Curve C
Curve D
0281434

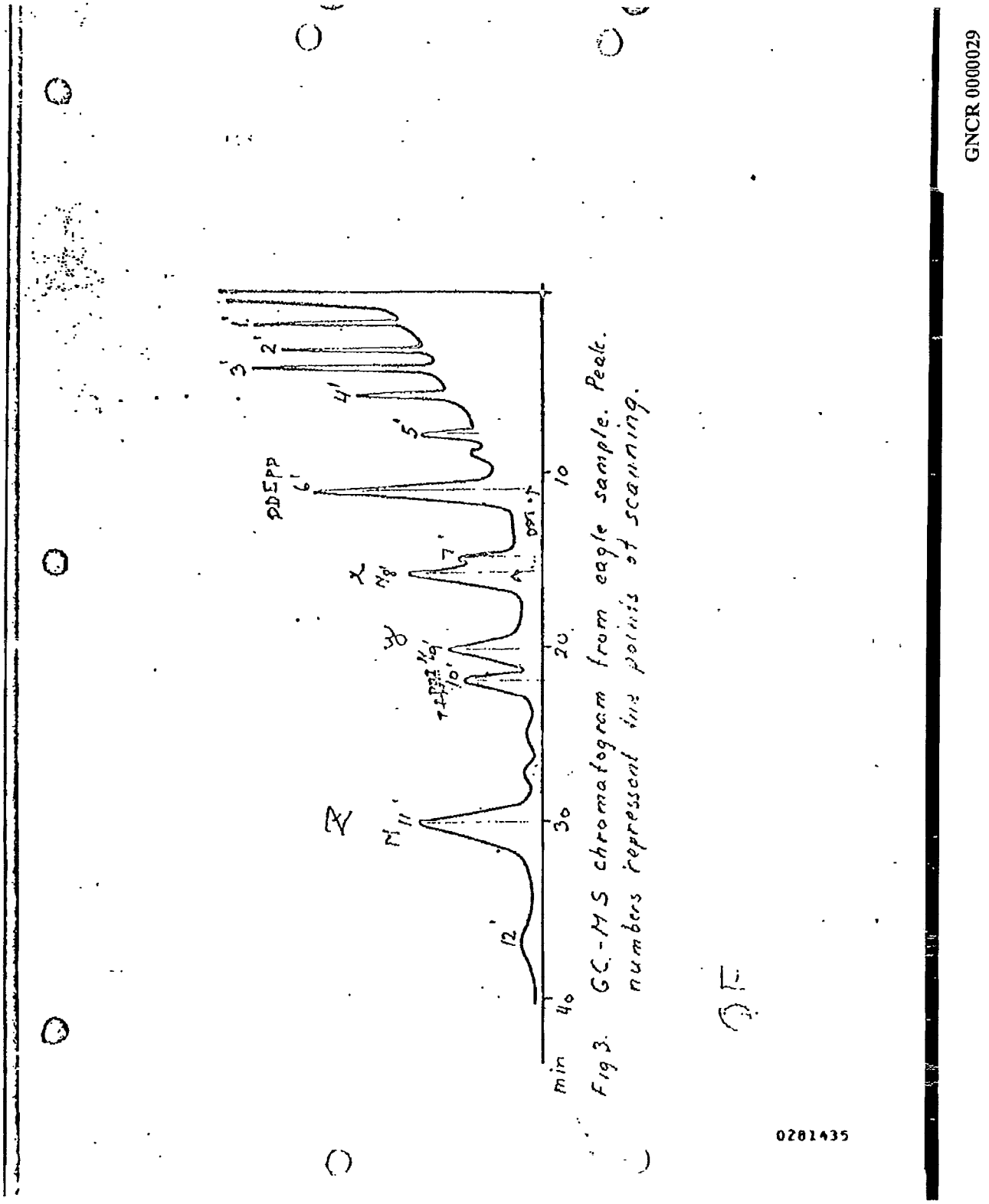
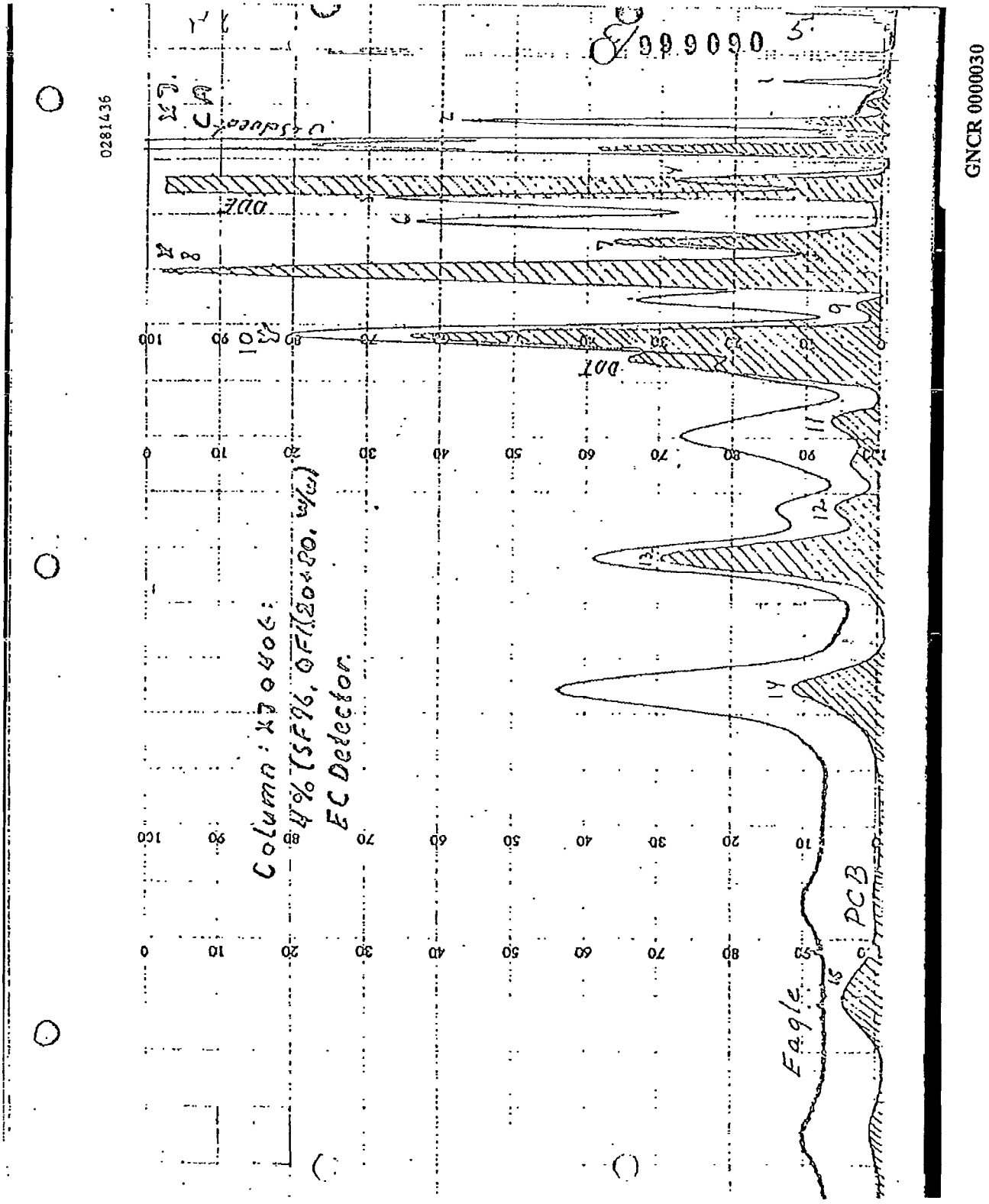


Fig 3. GC-MS chromatogram from eagle sample. Peak numbers represent time points of scanning.


0281436
GNCR 0000030
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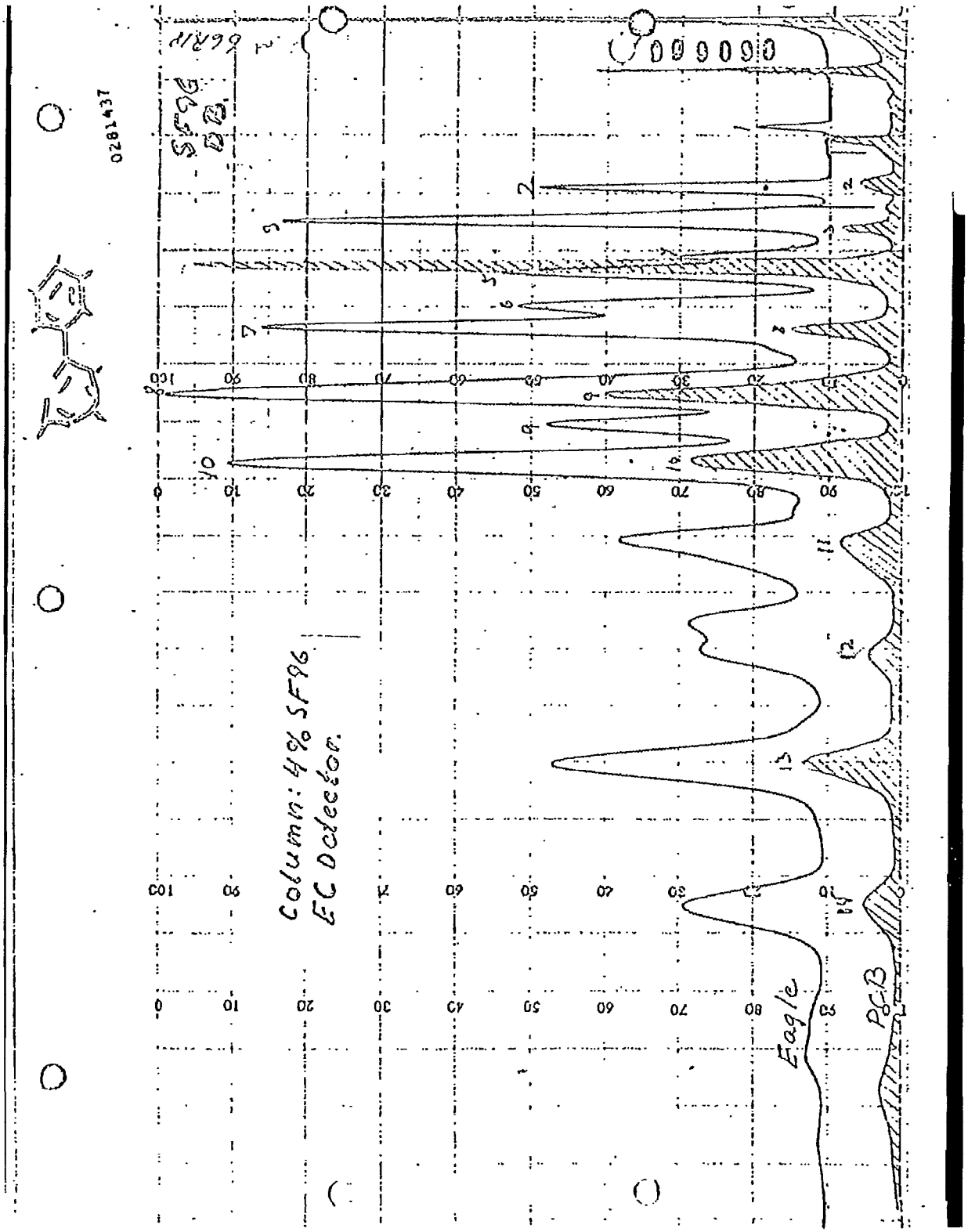
EC Detector
Eagle
PCB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0281437
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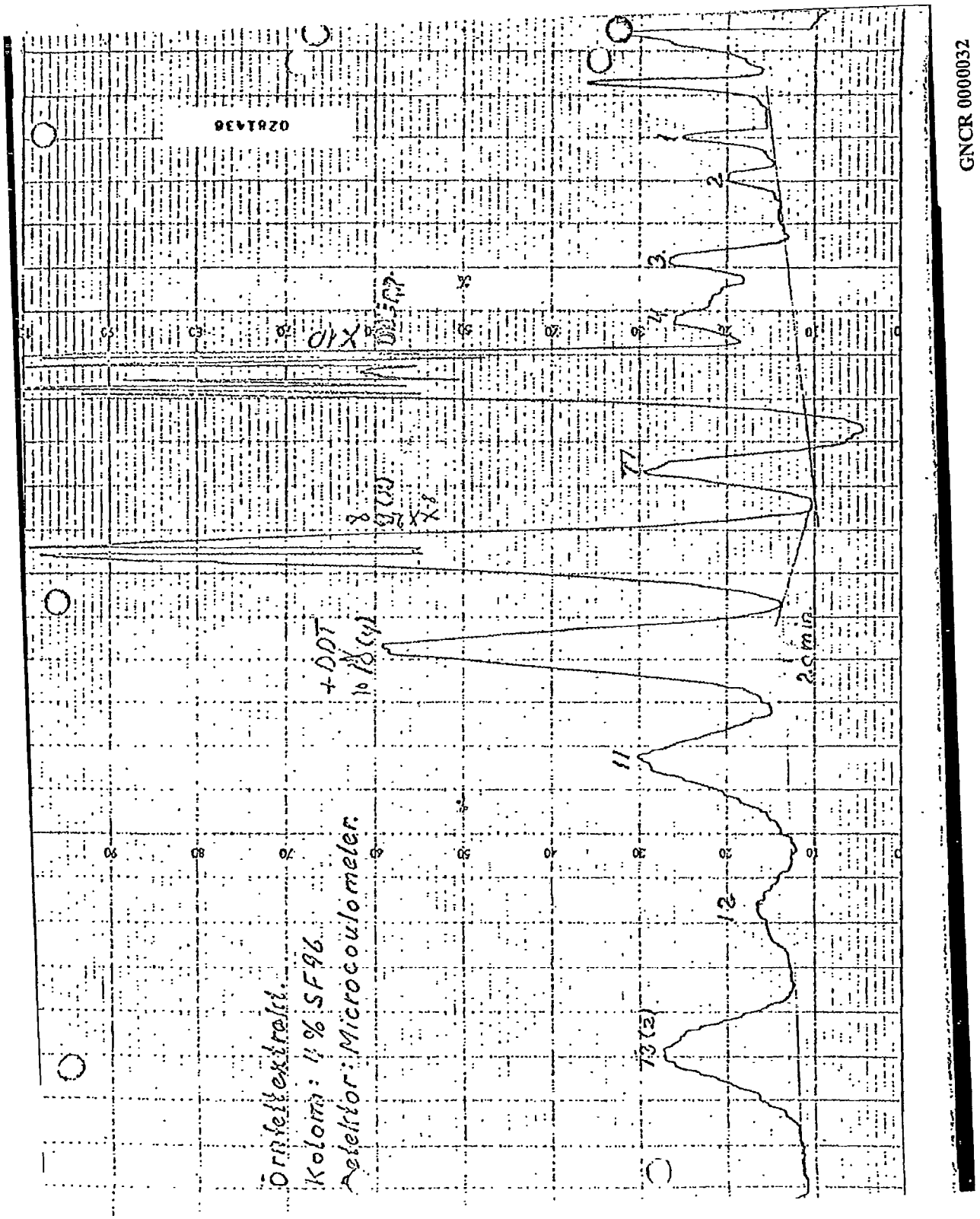
EC Detector
Eagle
PCB



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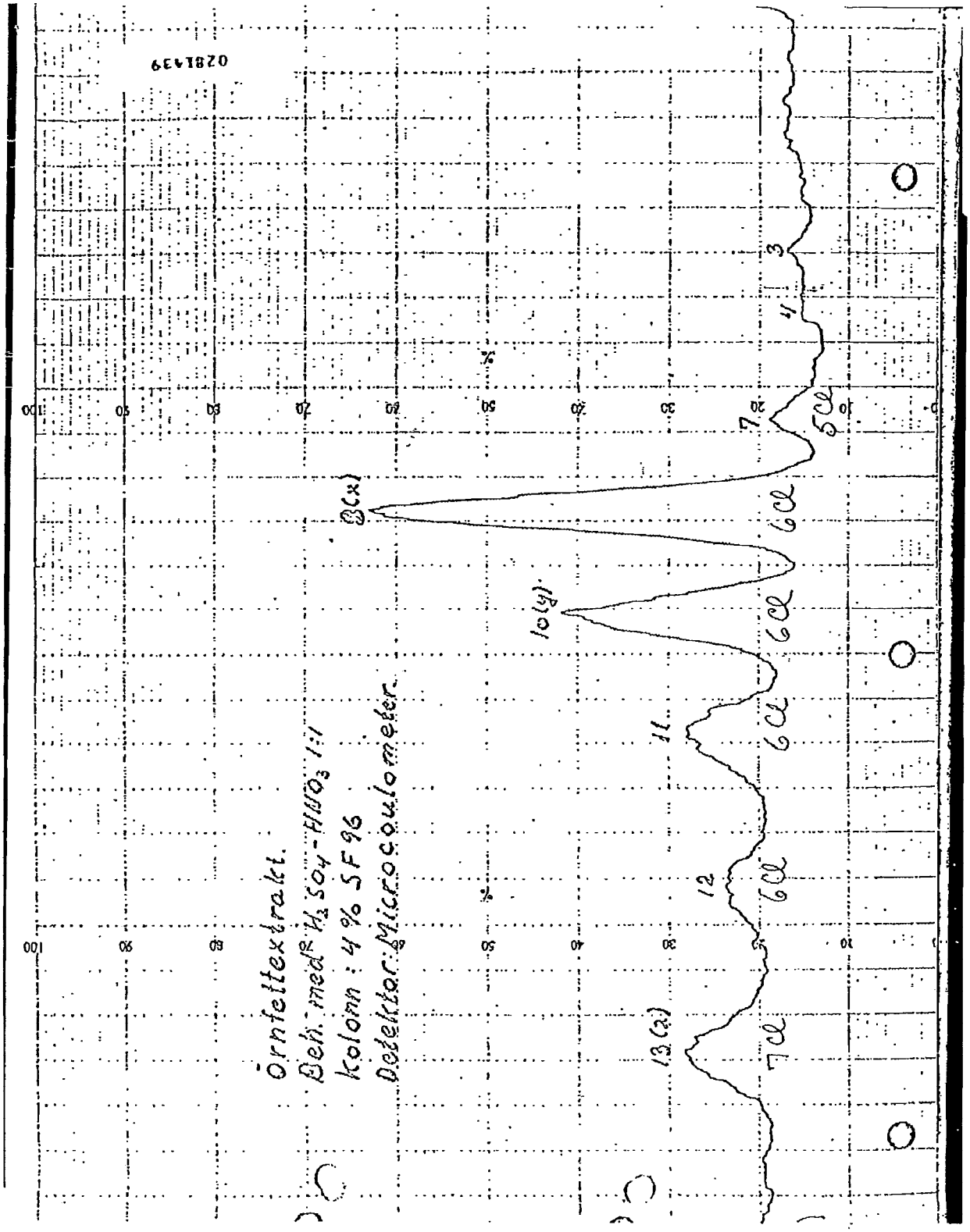

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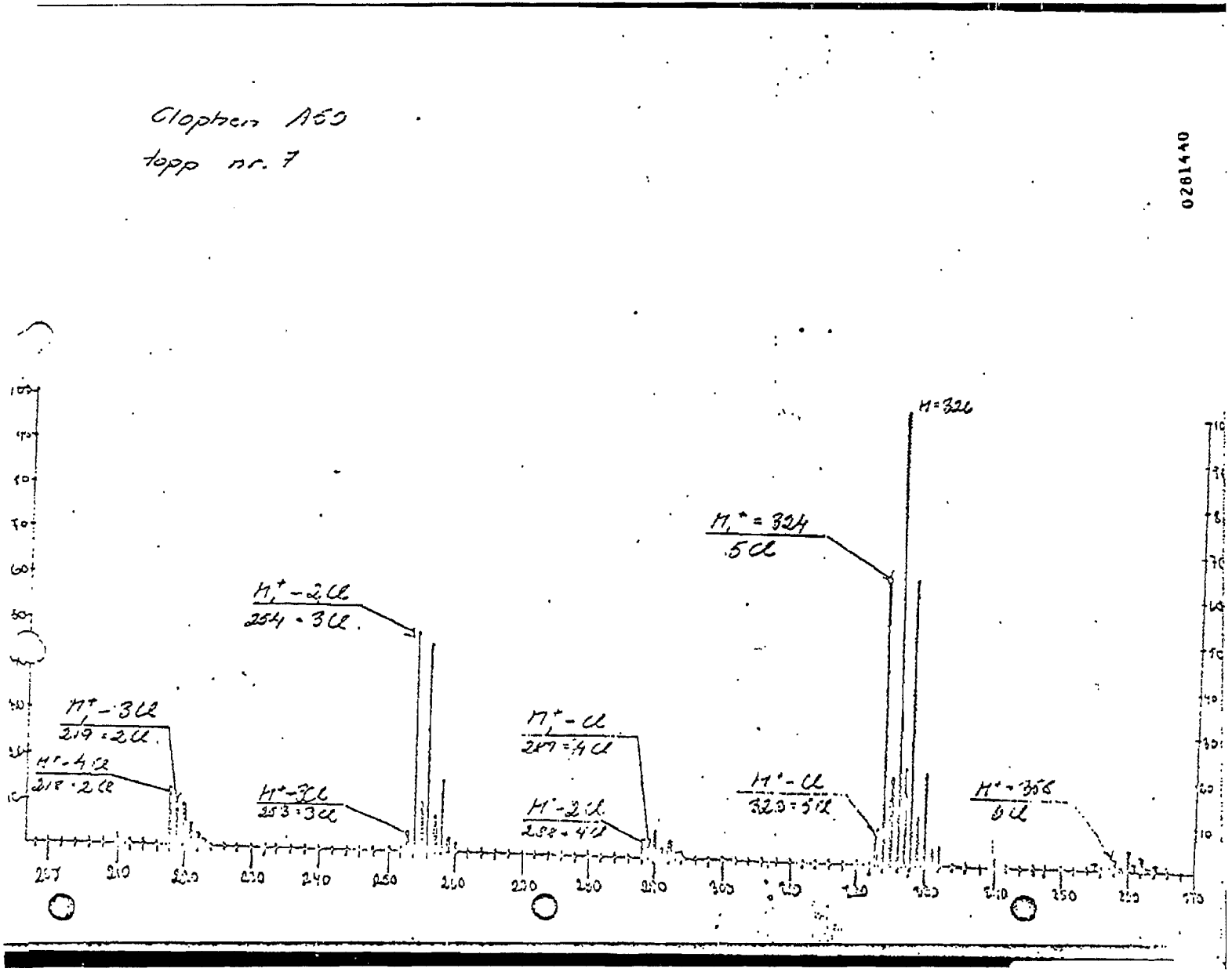

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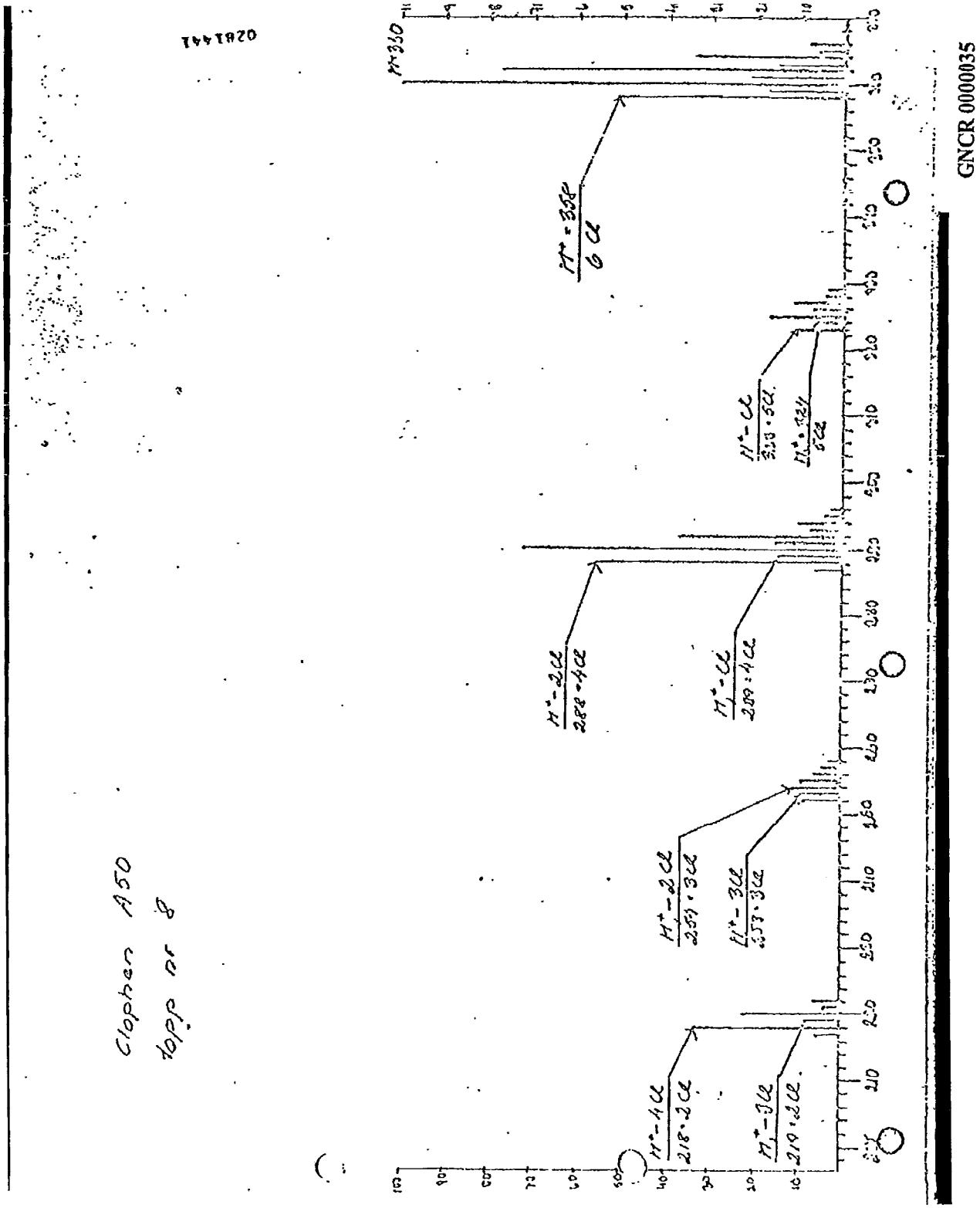
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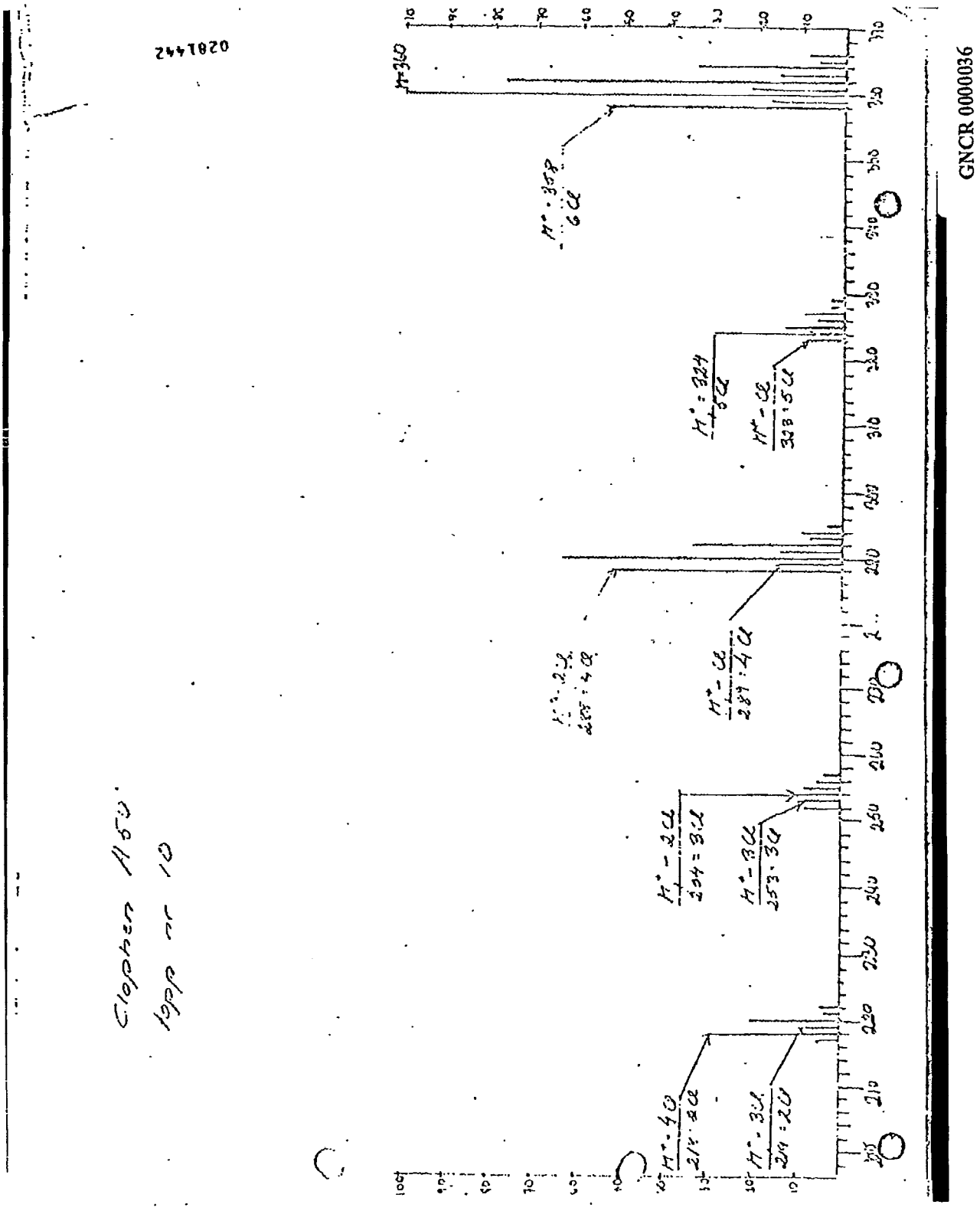
dope or 8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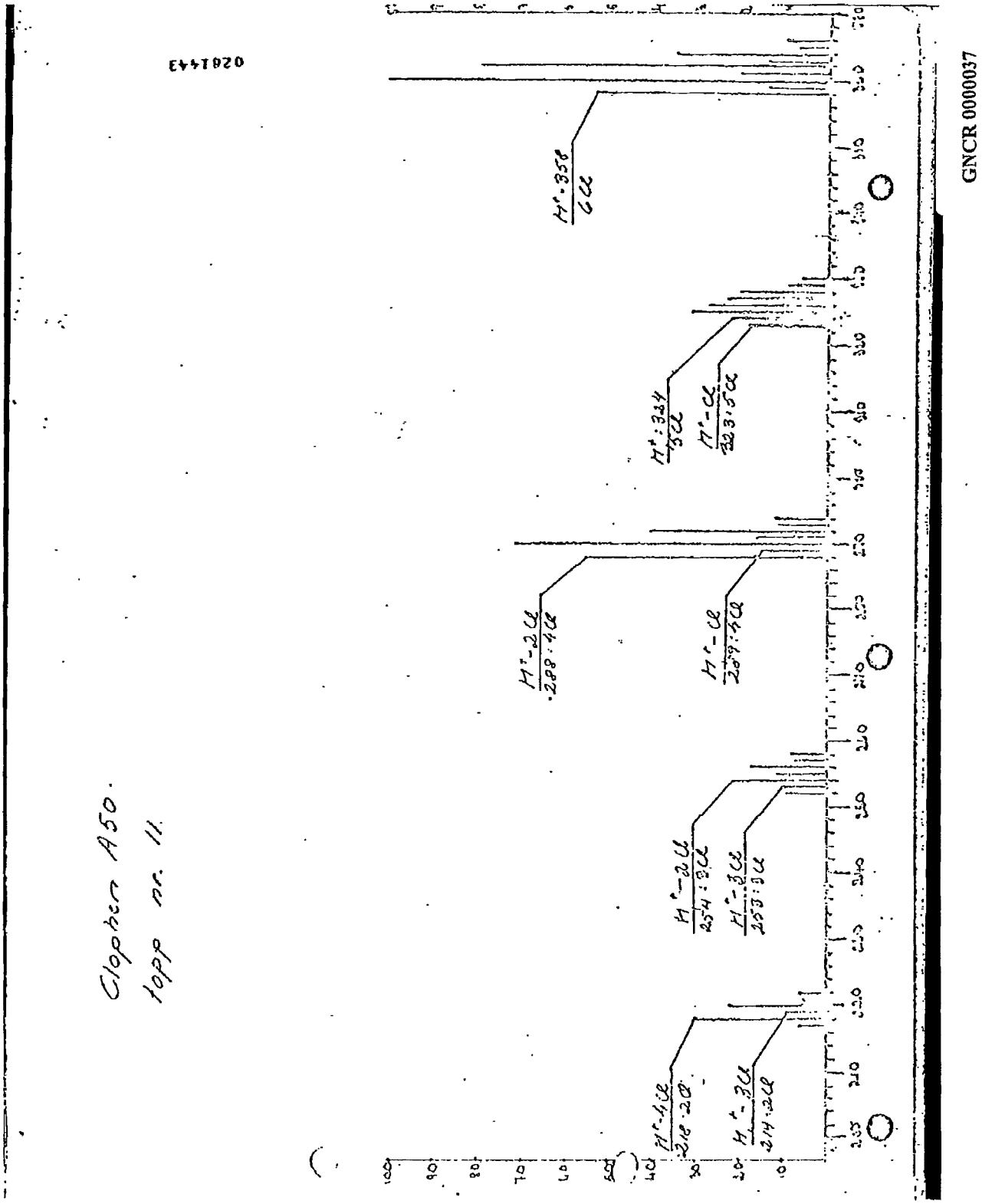
0261443
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Hope no. 11.
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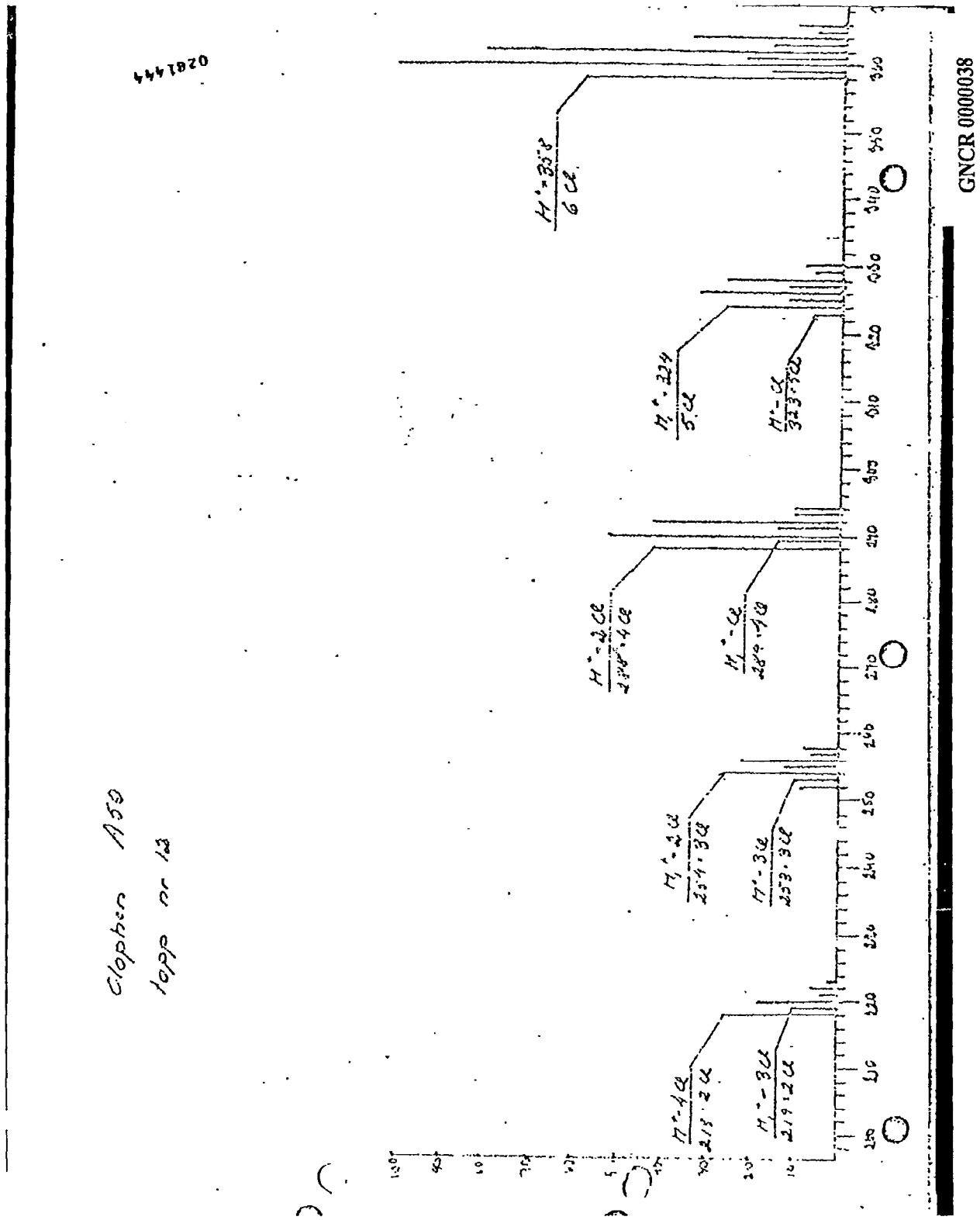
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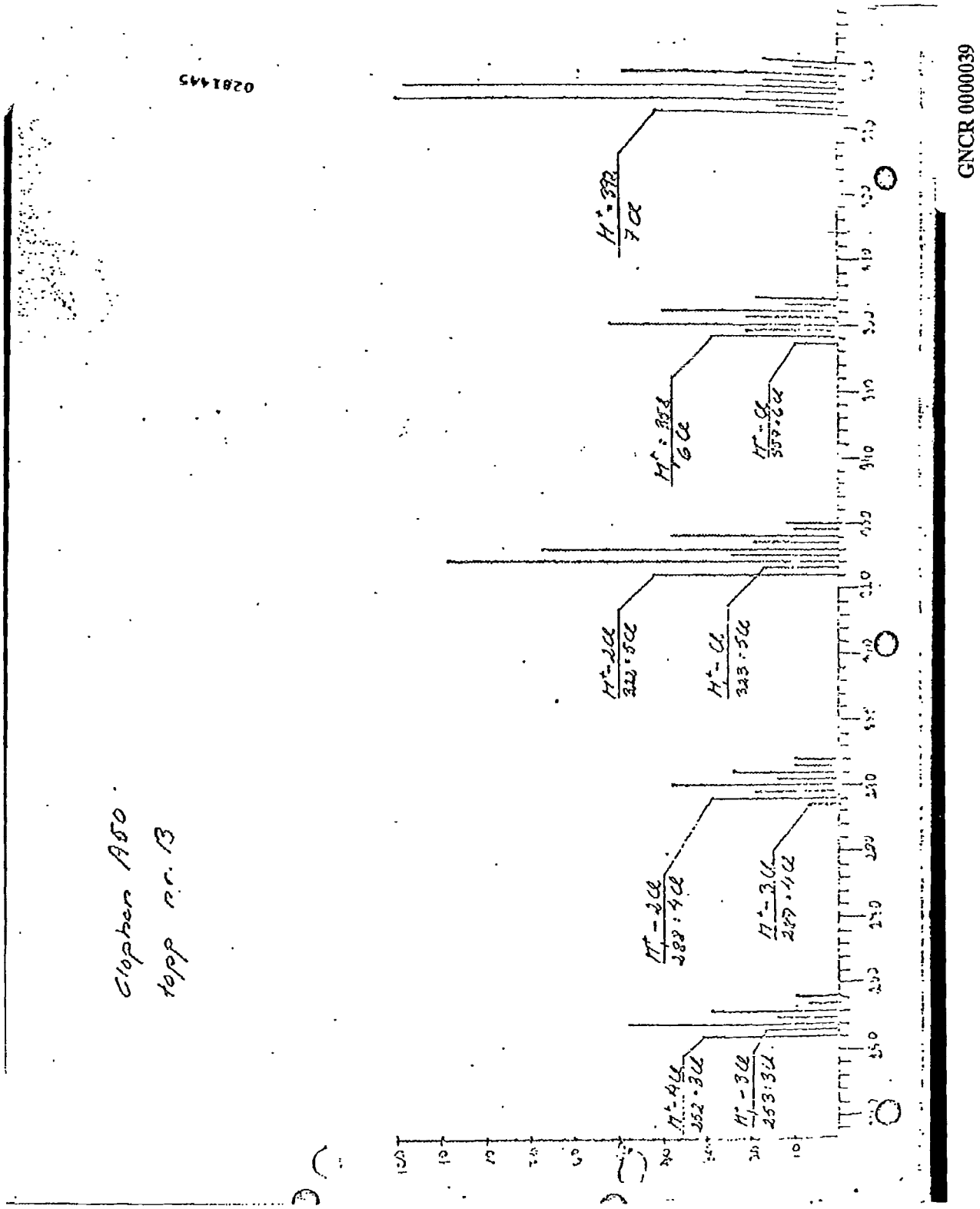
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0281445
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topp nr. 13

EXHIBIT G

NEW SCIENTIST Dec. 15, 1966

"Report of a New Chemical Hazard"

A Swedish research worker has expressed concern over the increased amounts of polychlorinated biphenyl (PCB) entering the air, presumably from industrial smoke and rubbish-dump smoke, and being absorbed by water and taken up by fish and later humans. PCB which is related to and as poisonous as DDT was detected by Mr. Sören Jensen of the Institute for Analytical Chemistry, University of Stockholm, in some 200 pike taken from different parts of Sweden, fish and fish-spawn throughout the country, an eagle which was found dead in the Stockholm Archipelago, and in his own, his wife's and baby daughter's hair. As the baby is only five months old her father concludes that she got her dose of PCB with her mother's milk.

It is not known at present how much of this substance is dangerous or even fatal. If it is comparable with DDT then the limit would be 0.5 mg per cubic metre of air--and, for comparison, the dead eagle had at least 10 times as high a concentration in its body. For purposes of elimination Mr. Jensen has obtained feathers from eagles preserved at the Swedish National Museum of Natural History since 1880 and has detected PCB first in an eagle from 1944.

In Sweden, PCB is known to be used in electrical insulations, hydraulic oils, high-temperature and high-pressure lubricating oils, paints, lacquers and varnishes, and as pigments in various plastics. It does not seem to be used as an insecticide. It is not destroyed by incineration and may enter the body directly through the skin, by breathing, or by way of food (especially fish). It is particularly harmful to the liver, and also the skin; this has been demonstrated by experiments on mice. PCB is much harder to break down than DDT and there is every reason to suppose that it is much more difficult to get it out of the system. The substance has also been detected in the air over London and Hamburg and also in seals caught off Scotland. It can therefore be presumed to be widespread throughout the world.

-oOo-

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EXHIBIT H

Polychlorinated Biphenyls in the Global Ecosystem

by

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Polychlorinated biphenyls are widely dispersed in the global ecosystem, and are powerful inducers of hepatic enzymes which degrade oestradiol. Together with other chlorinated biocides, such as DDT, they could account for a large part of the aberration in calcium metabolism which has been observed in many species of birds since the Second World War.

DECLINING populations of raptorial and fish-eating birds in Great Britain[1] and North America[2] have produced thin-shelled eggs since the period after the Second World War. A widespread change in the chemical environment which affected the calcium physiology of these species evidently occurred at that time. The chlorinated hydrocarbons, which came into general use in the 1940s, may now be the most abundant synthetic pollutants present in the global environment[3]. Thin eggshells have been found only in species which accumulate high concentrations of these compounds: relatively uncontaminated populations of these species continue to produce normal eggs[1,2].

Calcium metabolism in birds is intimately related to reproductive metabolism and is to a large extent regulated by steroids such as oestrogen and vitamin D[4]. The deposition of medullary bone, the chief source of calcium during egg and eggshell formation, is controlled by the steroid sex hormones[4–7], and hens deficient in vitamin D lay eggs with lower eggshell weights[8]. Steroids are hydroxylated and thereby degraded *in vivo* and *in vitro* by hepatic enzymes induced by exogenous, lipid-soluble substances, including the chlorinated hydrocarbons[9–14]. The relatively small amounts of chlorinated hydrocarbons required to produce this effect[9,11,15–18], and the discovery that small amounts of some of the DDT compounds are oestrogenic[9,19,20], have made irrelevant much of the parts per million approach to pollutant ecology based on toxicity data alone.

In both Great Britain[21–24] and North America[25] it was the decline of the peregrine falcon which initiated concern about the extent of the harmful effects of environmental contamination. In the United States the eastern population was extinct before competent observers were aware of a general, widespread decline[25]. Breeding peregrines persist in apparently normal numbers in British Columbia[26] and in the Arctic[27,28].

In 1967 we collected an unhatched, abandoned egg of a peregrine falcon in south-western North America, where a small remnant population remains (unpublished work of M. N. K., R. W. R. and S. G. H.). Analysis of this egg (Table 1) showed that it contained almost 5 mg of *p,p'*-DDE (dichloro-2,2-*bis*(*p*-chlorophenyl) ethylene). Unknown peaks present in the chromatograms of the extract of the egg were unidentified until polychlorinated biphenyls (PCB) were detected in European wildlife[29–31]. Positive confirmation of the identification was accomplished by mass spectrometry in Sweden[30]. The retention times of the unknown peaks in the peregrine extracts proved to be identical with those of several PCB compounds on *DC*-200 and *QF*-1 columns[3] and on a mixed *SE*-30:*QF*-1 column. Other species of birds and fish were subsequently analysed for PCB. The chlorine content of several extracts and standards was determined with a Dohrman microcoulometric detector and a method of quantification of the PCB compounds was devised based on peak heights produced in the electron capture detector related to standard *p,p'*-DDE[3]. The DDT compounds are destroyed by nitration[32] and *p,p'*-DDT (1,1,1-trichloro-2,2-*bis*(*p*-chlorophenyl)ethane), DDD (1,1-dichloro-2,2-*bis*(*p*-chlorophenyl)ethane) and toxaphene are dehydrochlorinated by saponification with alcoholic KOH. PCB is not degraded by either procedure.

Table 1. CHLORINATED HYDROCARBONS IN NORTH AMERICAN PEREGRINE FALCONS

Sample	Dieldrin	Total DDT*	Percentage DDE	PCB	DDT/PCB
1. Unhatched egg†					
Baja California (wet)	0·11	102	97	10·2	10
2. Second year ‡ migrant from Arctic					
Breast muscle (wet)	NM	99	94	28	3·5
Breast muscle (dry)		296		84	
Brain (wet)	NM	85	98	21	4·7
Carcass (wet)	0·87	70	93	19·7	3·5
Carcass (lipid)	62·5	5,000		1,420	
3. Immature, California§					
Breast muscle (wet)	NM	14·4	90	9·4	1·5
Liver (wet)	NM	7·7	92	4·5	1·7
Brain (wet)	0·04	2·8	89	1·5	1·9
Brain (lipid)	0·50	36		19·3	
Carcass (wet)	0·11	20·2	92	10·8	1·9
Carcass (lipid)	1·6	300		160	
4. Adult, California‖					
Breast muscle (wet)	NM	127	87	98	1·3
Liver (wet)	NM	77	80	57	1·4
Brain (wet)	0·31	49·5	86	34·6	1·4
Brain (lipid)	3·7	595		415	
Carcass (wet)	1·7	85	87	65	1·3
Carcass (lipid)	50	2,600		1,980	
5. Immature¶ migrant from Arctic					
Breast muscle (wet)	NM	2·3	81	0·16	14
Breast muscle (dry)		7·8		0·54	
Liver (wet)	NM	1·0	92	0·10	10
Brain (wet)	NM	0·43	83	0·037	12
Body fat (wet)	NM	50·3	82	3·2	16
Carcass (wet)	0·07	9·3	82	0·80	12
Carcass (lipid)	0·44	63·7		5·5	
6. Immature Arctic migrant**					
Breast muscle (wet)	NM	1·9	89	0·6	3·4
Breast muscle (dry)		6·0		1·9	

Concentrations in parts per million wet weight, dry weight or lipid weight.

* DDT residues include: *p,p'*-DDT, *p,p'*-DDE, *p,p'*-DDD (*p,p'*-TDE), *p,p'*-DDMU, *o,p'*-DDT and *o,p'*-DDE. NM, Not measured.

† Chlorinated hydrocarbon contents of the egg were: 4,700 μg *p,p'*-DDE; 40 μg *o,p'*-DDE; 29 μg *p,p'*-DDT; 7·4 μg *p,p'*-DDD; 37 μg *p,p'*-DDMU; 5 μg dieldrin; 12 μg heptachlor epoxide. Concentrations were calculated by assuming a volume of 47·3 ml., the average value obtained by measuring eleven clutches of peregrine eggs from California in the Museum of Vertebrate Zoology, University of California, Berkeley, and by assuming a density of 1·0.

‡ Second year female, captured in October on the Texas coast during migration. Died in captivity shortly afterwards, no apparent cause of death. No body fat. Total body content of chlorinated hydrocarbons: 35 mg DDT, 10 mg PCB, 0·44 mg dieldrin, 0·18 mg heptachlor epoxide. Total body lipid, 7 g.

§ Plumage characteristics of both 3 and 4 were intermediate between those of typically resident California birds and the Arctic race *F.p. tundrius*, as described by White[33]. No. 3 was an immature female of the year trapped in the southern San Francisco Bay area in the winter of 1966. Observed feeding in the area for a week before capture. Died suddenly after eating a dead gull. Moderate body fat. Total body chlorinated hydrocarbon content: 13 mg DDT, 6·8 mg PCB, 0·07 mg dieldrin, 0·09 mg heptachlor epoxide. Total body lipid, 43 g.

‖ Adult female. Trapped in the southern San Francisco Bay area in the winter of 1966. Observed feeding in the area for a month before capture. Died shortly afterwards with no apparent cause of death and no body fat. Total body chlorinated hydrocarbon content: 52 mg DDT, 40 mg PCB, 1·0 mg dieldrin, 1·0 mg heptachlor epoxide. Total body lipid, 20 g.

¶ First year female trapped on the Texas coast in October. Lost at Pt Mugu, California, the following January and was shot by a sportsman 3 weeks later. Abundant body fat. Total body content: 7 mg DDT, 0·6 mg PCB, 0·05 mg dieldrin, 0·17 mg heptachlor epoxide. Total body lipid, 110 g.

** First year female trapped on the Texas coast in October. Died shortly afterwards of heat prostration.

In Table 1 are presented the results of analyses of peregrine falcons which died from a variety of causes

shortly after being trapped for falconry. Significant amounts of PCB were present in Arctic peregrines only a few months old (Nos. 5 and 6), but higher residues were present in a second year Arctic bird (No. 2) and exceptionally high residues were present in an adult trapped in California (No. 4). In birds 2 and 4 the total lipid reserves were very low, and in both the brain concentrations of DDE and PCB were high, perhaps at toxic levels. Fat mobilization during reproduction or in times of starvation or stress could be expected to cause significant changes in the internal distribution of chlorinated hydrocarbons. Steroid hydroxylase activity in the liver might increase at this time. Dieldrin concentrations were lower than in the peregrines analysed in Britain, but DDE concentrations were approximately comparable[34].

Table 2 presents the results of analyses of peregrine prey species, remains of which were collected at eyries in Baja California, Mexico. With the exception of the remains of one mourning dove (*Zenaidura macroura*) and of three fish bats (*Pizonyx vivesi*), prey material found at four eyries consisted of sea birds. Of these, the eared grebe (*Podiceps caspicus*) and the black petrel (*Loomelania melania*) constituted 32 and 25 per cent, respectively, of the remains.

Black petrels, like other petrels and shearwaters (Table 3), contained especially high concentrations of both DDT and PCB. Reproductive success in this population of peregrines seems to be subnormal. In 1968 no pairs were observed to hatch or fledge more than a single young. In the past, two to four young, the number normally produced by healthy peregrines[25,27], were raised by each pair (L. W. Walker, personal communication). The thickness of fragments of a peregrine eggshell, with its membrane, collected in 1968 below an eyrie where one young hatched, was 0·24 mm, a decrease of 34 per cent from the mean thickness of 0·34 mm ± 0·015 mm (95 per cent confidence level) in twenty-three eggs collected in the area before 1947. The region is wilderness, with little or no human interference, and is remote from sources of pollution.

In California, numbers of breeding peregrines have been reduced by at least 80 per cent in recent years. The remaining few pairs, however, seem to be reproducing normally and rear, when undisturbed, between two and four young each year. They are found, like most of the surviving pairs in Great Britain[21–24], in a relatively uncontaminated region and seem to be feeding on birds which contain low concentrations of chlorinated hydrocarbons. A pair which fledged three young in 1968 fed chiefly on passerines and columbiformes during the breeding season. Both prey groups are relatively uncontaminated (M. N. K., R. W. R. and S. G. H., in preparation). A clutch of eggs collected in this region weighed as much as the eggs obtained in pre-war years, whereas other peregrine eggs from California collected since the Second World War have been thin-shelled (ref. 2, and D. W. Anderson, D. Hickey and R. F. Christensen, in preparation). Despite official protection the surviving birds are still subjected to shooting by sportsmen and to harassment at the eyries. If these could be effectively reduced the population might yet survive.

In Table 3 are presented the results of analyses of marine and terrestrial birds and of three species of freshwater fishes for PCB and DDT content and concentration. From the ratio of total DDT to PCB, it is apparent that regional fallout patterns exist. In most of the birds from San Francisco Bay which have been analysed, including peregrine falcons (Table 1) and eggs of the western gull, the Caspian tern and the black-crowned night heron (Table 3), the ratio was between one and two. Another black-crowned night heron egg had a typically "ocean" profile, suggesting that the adult female had wintered along the coast. In most of the birds from the Farallon Islands, which are 27 miles west of the Golden Gate Bridge, this ratio was between 2 and 5. In the Gulf of Panama, where PCB contamination might come from the Canal Zone and industrial areas in Panama City, the ratio is between 1 and 2 (Table 3).

In the Gulf of California, a region relatively remote from the sources of either DDT or PCB contamination, the ratio was in most cases approximately 9 or 10. This was true in the egg of the peregrine falcon (Table 1), in all of the black petrels and least petrels analysed, in the Craveri's murrelets (Table 2), in five of six osprey eggs and in six of seven western gull eggs (Table 3). Among the exceptions the fish bat, with low concentrations of both DDT and PCB, was the most divergent, with a ratio of 43 (Table 2). It is not clear whether this reflects differences between avian and mammalian physiology or a fundamental difference in feeding habits. The other exceptions include species which are present in the area only during the breeding season (Table 2).

In sea birds from the Pacific the ratio was usually between 5 and 10 (Table 3). PCB was not found in eggs of the Adelie penguin from Cape Crozier, Antarctica.

Table 2. PCB AND DDT IN PREY SPECIES OF PEREGRINE FALCONS IN THE GULF OF CALIFORNIA

Species*	N	DDT (μg)	DDT (p.p.m.)	Percentage DDE	PCB (μg)	PCB (p.p.m.)	DDT/PCB
Eared grebe (13)							
Whole body	3	—	0·28, 0·26, 12·1	97	NM†		—
Black petrel (10)							
Whole body	8	810 (685–1,344)	9·2 (W)	81	—	1·0 (W) (0·90–1·14)	9·2
Least petrel (6)							
Whole body	3	99	3·2 (W)	83	—	0·35 (W)	9·3
Eggs	2	30 (23–37)	—	84	3·1 (1·2–5·0)	—	10
Fish bat (3)							
Whole body	7	25 (15–31)	0·71 (W)	62	0·58 (0·45–1·06)	0·02 (W)	43
Craveri's murrelet (2)							
Eggs (one clutch)	2	230‡ (223–238)	39 (L)	80	—	4·5 (L)	8·7
Whole body, adult	1	37·1	0·31 (W)	85	—	0·039 (W)	7·9
Whole body, adult	1	295	2·4 (W)	85	—	0·26 (W)	9·2
Elegant tern (1)							
Eggs	8	15·5 (9·6–24·3)	5·0 (L)	90	—	1·5 (L) (0·8–3·6)	3·9
Heermann's gull (1)							
Eggs	3	195 (94–278)	48 (L)	95	—	8·1 (L) (3·5–11·3)	5·9

Content in μg of whole bodies and eggs; concentrations in p.p.m. wet weight (W) or lipid weight (L).

* All specimens were collected in the vicinity of four peregrine eyries in Baja California. Numbers in parentheses are the number of remains of each prey species which were found at the eyries. Also found were remains of one cormorant (*Phalacrocorax* sp), one red phalarope (*Phalaropus fulicarius*), one northern phalarope (*Lobipes lobatus*) and one mourning dove (*Zenaidura macroura*), but local specimens of these species were not analysed. Eggs of least petrels, elegant terns and Heermann's gulls were from different clutches. Eared grebe: *Podiceps caspicus*; black petrel: *Loomelania melania*; least petrel: *Halocyptena microsoma*; fish bat: *Pizonyx vivesi*; Craveri's murrelet: *Endomychura craveri*; elegant tern: *Thalasseus elegans*; Heermann's gull: *Larus heermanni*.

† Not measured. Interfering peaks on chromatograms.

‡ Both eggs also contained 0·08 p.p.m. dieldrin (lipid weight) and 0·17 p.p.m. endrin (lipid weight).

Table 3. PCB AND DDT IN THE GLOBAL ECOSYSTEM

Species	N	Total DDT (μg)	Total DDT (p.p.m.)	Percentage DDE	PCB (μg)	PCB (p.p.m.)	DDT/PCB
White crappie (1)	1	—	1·83 (W)	6	—	0·004 (W)	475
Black crappie (2)	1	—	2·10 (W)	6	—	0·003	660
Bluegill (3)	1	—	5·5 (W)	6	—	0·005	1,200
Adelie penguin (4)							
Eggs	5	0·78 (0·59–1·04)	0·128 (L)	74	< 0·044 μg/egg		> 18
Western grebe (5)							
Breast muscle	1	—	26·4 (W)	5	—	0·098 (W)	270
Fulmar (6)							
A	1	—	0·41 (W)	76	—	0·08 (W)	5
B	1	—	3·4 (W)	89	—	0·34 (W)	10
C	1	10,475	17·5 (W)	96	3,900	6·5 (W)	2·7
Pink-footed shearwater (7)	1	2,000	3·0 (W)	93	277	0·42 (W)	7·2
Sooty shearwater (8)							
A	1	—	12·3 (W)	94	—	1·2 (W)	10
B	1	—	10·3 (W)	86	—	0·9 (W)	12
C	1	1,265	2·3 (W)	85	NM		
Slender-billed shear-water (9)	1	—	32·0 (W)	92	—	2·1 (W)	15
Ashy petrel (10)	3	2,158 (1,644–2,826)	59·3 (W)	95	389 (298–482)	9·8 (W)	5·5
Brown pelican (11)							
Eggs, Panama	6	59 (18–183)	11·5 (L)	61 (47–78)	23·1 (18–30)		1·55 (0·97–3·2)
Eggs, Baja California	2	53 (47–59)	10·0 (L)	81	10·4 (9·0–11·7)	—	6·5, 4·0
Frigate-bird (12) eggs, Panama	3	9·6, 8·7, 30·0	—	88	8·4, 5·7, 84·0	—	1·1, 1·5, 0·4
Brown booby (13) eggs, Panama	4	20·8 (16·4–24·5)	8·2 (L)	89	12·2 (6·5–18·9)	4·8 (L)	1·7
Brandt's cormorant (14) eggs	17	326	—	91	113	—	2·9
Pelagic cormorant (15) eggs	2	128 (125–130)	—	90	62 (48–75)	—	2·1
Cinnamon teal (16)	1	4,340	10·9 (W)	70	—	0·91	12
White-tailed kite (17)							
Eggs, clutch *A*	4	11·4 (9·8–12·9)	0·76 (W)	77	6·4 (5·5–7·8)	—	1·8
Unhatched egg *B*	1	5·1	0·34 (W)	82	0·84	—	6·0
Unhatched egg *C*	1	5·3	0·35 (W)	73	3·6	—	1·5
Clutch *D*	2	8·3/egg	—	82	4·3/egg	—	2·0
Clutch *E*	3	10·2/egg	9·0 (L)	57	4·0/egg	—	2·6
Clutch *F*	4	31·9/egg	—	80	3·8/egg	—	8·5
Cooper's hawk (18)	1	8,500	25·2 (W)	90	—	6·3	4·0
Golden eagle (19) egg	1	150	2·0 (W)	98	17·5	0·23 (W)	8·5
Osprey (20), Baja California	6	127 (30–264)	55 (L)	85	(7·3, 3·0, 103) (24, 7·0, 19)	—	8·5, 10·1, 1·3, 11·2, 9·7, 11·1
Merlin (21)	1	435	2·9 (W)	94	55·4	0·39 (W)	12·7
American kestrel (22)							
Whole body, adult	1	5·1	0·044	39	3·7	0·031	1·4
Eggs, two clutches	6	2·4/egg	0·20 (W)	93	1·0/egg	0·09 (W)	2·3
Black-crowned night heron (23)							
Egg	1	541	—	89	330	—	1·6
Egg	1	869	—	99	23	—	36
Western gull (24)							
Eggs, San Francisco Bay, three clutches	4	803 (632–1,123)	—	85	805 (580–1,310)	—	1·0
Eggs, Farallon Is., ten clutches	10	412 ± 102	—	89	136 ± 55	—	3·0
Eggs, Baja Calif., seven clutches	7	385 ± 230	—	97	45 ± 30	—	9·1, 10·5, 5·0, 12·3, 10·6, 10·7, 10·5
Forster's tern (25) eggs	2	665 (598–732)	—	89	114 (91–137)	—	5·8
Caspian tern (26)							
Eggs, San Francisco Bay	2	1,269 (1,216–1,322)	—	89	805 (660–950)	—	1·7
Eggs, San Diego Bay	5	1,430 (991–2,430)	—	88	1,010 (550–1,600)	—	1·4
Red phalarope (27)	1	—	0·78 (W)	79	—	0·10	8
Common murre (28) eggs	6	1,945 (932–3,621)	151 (L)	90	558 (364–1,010)	45 (L)	3·5
Cassin's auklet (29)	1	—	5·8 (W)	98	—	0·16	36
Ancient murrelet (30)	1	—	0·75	90	—	0·15	5
Rhinoceros auklet (31)	1	—	2·7	97	—	0·36	8
Mourning dove (32)	2	12·0, 33·1	0·19 (W)	77, 93	Not detected	—	—
Barn owl (33)							
Eggs, one clutch	3	27·7/egg	1·25 (W)	95	10·4/egg	0·47 (W)	2·7
Eggs, one clutch	2	143/egg	6·6 (W)	96	14·4/egg	0·66 (W)	10
Meadowlark (34)	2	21·2, 448	0·18, 3·3 (W)	77, 93	2·5, 28·1	—	8·4, 15·9

Content in μg and concentrations in p.p.m. wet weight (W) or lipid weight (L).
Unless otherwise specified, analyses were of whole bodies. Endrin and dieldrin were identified on the basis of retention times on both *QF*-1 and *DC*-200 columns.

1. *Pomoxis annularis*, 284 g, Clear Lake, Lake Co., Calif., May 1968.
2. *Pomoxis nigromaculatus*, 212 g, Clear Lake, Lake Co., Calif., May 1968.
3. *Lepomis macrochirus*, 229 g, Clear Lake, Lake Co., Calif., May 1968.
4. *Pygoscelis adeliae*, Cape Crozier, Antarctica, October 1967.
5. *Aechmophorus occidentalis*, Clear Lake, Lake Co., Calif., May 1968.
6. *Fulmanus glacialis*. *A* and *B*: Monterey Bay, Calif., November 1, 1966. *C*: Point Reyes, Calif., December 1967. Fulmars breed in Alaska.
7. *Puffinus creatopus*. Breeds in Chile. Collected in May 1968, in the Gulf of California.
8. *Puffinus griseus*. Breeds in New Zealand and Chile. *A* and *B*: Monterey Bay, November 1, 1966. *C*: Gulf of California, May 1968. NM, Not measured, interfering peaks.
9. *Puffinus tenuirostris*. Breeds in Australia. Monterey Bay, December 1966.
10. *Oceanodroma homochroa*. Farallon Islands, Calif., May 1968.
11. *Pelecanus occidentalis*. Panama eggs were collected on Isla Pacheca and Isla Pachequilla, Gulf of Panama, February 1968. One egg contained 0·06 p.p.m. dieldrin and 0·06 p.p.m. endrin, another contained 0·16 p.p.m. dieldrin and 0·07 p.p.m. endrin (lipid weight). Baja California eggs were collected at Bahia de los Angeles, March 1968. One egg contained 0·24 p.p.m. dieldrin and 1·13 p.p.m. endrin (lipid weight).
12. *Fregata magnificens*. Isla Pacheca, Panama, February 1968.
13. *Sula leucogaster*. Isla Pacheca and Isla Pachequilla, Panama. February 1968. Two eggs were analysed for dieldrin and endrin. Dieldrin: 0·08, 0·18 p.p.m.; endrin: 0·06 and 0·011 p.p.m. (lipid weight).
14. *Phalacrocorax penicillatus*. Farallon Islands, May 1967.
15. *Phalacrocorax pelagicus*. San Mateo Co., Calif.
16. *Anas cyanoptera*. San Diego, April 1968. Adult male.
17. *Elanus leucurus*. *A*: Contra Costa Co., Calif., April 1968. *B* and *C*: Contra Costa Co., May 1968, two and three young raised, respectively. *D*: Abandoned, Contra Costa Co., May 1967. *E* and *F*: Destroyed nests, Contra Costa Co., March 1968.

Table 3 (*continued*)

18. *Accipiter cooperii*. Balboa Park, San Diego, February 1968. First year female, died of trichomoniasis.
19. *Aquila chrysaetos*. San Luis Obispo Co., Calif., April 1968. Unhatched egg in nest where one young was raised. Egg also contained 4·7 μg of dieldrin, 1·9 μg of heptachlor epoxide, but no endrin.
20. *Pandion haliaetus*. Gulf of California, March 1968. One egg also contained 0·10 p.p.m. dieldrin and 0·25 p.p.m. endrin (L).
21. *Falco columbarius*. Immature, Utah, December 1967.
22. *Falco sparverius*. Adult was killed on road, Mendocino Co., Calif., December 1967. Eggs from Davis, California, 1968.
23. *Nycticorax nycticorax*. Eggs from different clutches, San Francisco Bay, May 1967.
24. *Larus occidentalis*. Standard errors, 95 per cent confidence limits.
25. *Sterna forsteri*. San Diego Bay, May 1967.
26. *Hydroprogne caspia*, 1967.
27. *Phalaropus fulicarius*. Monterey Bay, November 1, 1966.
28. *Uria aalge*. Farallon Islands, May 1967.
29. *Ptychoramphus aleuticus*. Farallon Islands, April 1966.
30. *Synthliboramphus antiquum*. Monterey Bay, November 1, 1966.
31. *Cerorhinca monocerata*. Monterey Bay, November 1, 1966.
32. *Zenaidura macroura*. San Diego, July 1968.
33. *Tyto alba*. Clutch *A* from Contra Costa Co., Calif., March 1968. Clutch *B* from Yolo Co., Calif., April 1968.
34. *Sturnella neglecta*. Davis, Calif., December 1967.

In these, however, the amount of DDT was very low; with a DDT:PCB ratio of 18, no PCB would have been detected. A larger amount of fat material from Antarctic organisms, which would contain more DDT, would therefore have to be analysed before concluding that PCB has not yet reached the Antarctic.

Individuals of species resident in industrial areas have, as expected, higher PCB levels than individuals of the same species from more remote regions. Analysis of ten eggs from ten clutches of the western gull from the Farallon Islands showed an average PCB content of 136 ± 55 μg (95 per cent confidence level). PCB content of four eggs from three clutches from an island in San Francisco Bay averaged 805 μg with a range from 580 to 1,310 (Table 3). Seven eggs from seven clutches in the Gulf of California contained 45 ± 30 μg of PCB. The DDT content of the eggs from the Farallons was not significantly different from that of the Baja California eggs.

Birds from the Gulf of California also contain dieldrin and endrin (Tables 2 and 3), but the number of analyse is as yet insufficient to compare their relative abundance with that of DDT and PCB. Despite the inability of the Shell Chemical Company to find any chlorinated hydrocarbons in the Gulf of California and at the mouth of the Colorado River[35], which drains into the Gulf, it is likely that some do enter from the Colorado River and from agricultural areas in western Mexico. A significant fraction, however, must come from the atmosphere[36], and air transport best explains the presence of PCB in remote areas. In extracts from the Gulf of California one PCB compound was present in relatively small concentrations. This compound is readily degraded by ultraviolet light irradiation in laboratory experiments, and may therefore be selectively degraded in the atmosphere. Although PCB is not soluble in water, it has a low but finite vapour pressure[37]. Incineration of materials containing PCB would greatly increase the rate of entry into the atmosphere. PCB is used in the manufacture of many industrial products, so the high amounts found in San Francisco Bay, Puget Sound[3] and San Diego Bay presumably result from direct discharge of industrial wastes into these waters and from local fallout.

The presence of PCB in the few land birds and freshwater fish analysed indicates that it is also distributed among continental ecosystems in North America. Peregrines could therefore acquire PCB, as well as the other chlorinated hydrocarbons, over all their global range. No PCB residue data are available for prey species from the Atlantic, but compounds which seem to be PCB have been isolated from seals[38]. A second year male peregrine spent the winter of 1967–68 on Isla Pacheca, Panama, where the pelican, booby and frigate-bird eggs of Table 3 were collected. The Cooper's hawk which was analysed, a species which also preys upon birds, contained high residues of both DDT and PCB (Table 3). Cooper's hawks have declined in eastern North America and in some regions have produced thin-shelled eggs[34]. Several species of raptors do not accumulate high amounts of the organo-chlorine compounds (Table 3), a result of the very low residue levels usually found in their prey. American kestrels and barn owls are common residents of California cities. The white-tailed kite, which was near extinction 40 years ago in California, is now abundant in areas where insecticide use is intense, yet because it preys primarily upon the short-lived and herbivorous vole, *Microtus*, the species accumulates very little DDT or PCB (Table 3).

Previous work[18] has shown that both DDT and dieldrin induce hepatic enzymes in the pigeon which, in an *in vitro* preparation, increase the metabolism of progesterone and testosterone. This work has now been extended to study the metabolism of oestradiol by enzymes induced by *p,p′*-DDE, technical DDT (Dupont) and PCB ('Aroclor 1262'). The experimental procedure previously described[18] was followed except that the chlorinated hydrocarbons were injected intramuscularly rather than given orally, and in the separation of oestradiol and its metabolites the solvent system used was the upper layer of a mixture of benzene:heptane:methanol:water 7:3:8:2. The strips were monitored with an autographic strip scanner. The profiles obtained for the various inducing agents are shown in Fig. 1. It will be noted that the profiles of the metabolites obtained after enzyme induction using DDE and DDT are identical, but that a different metabolite is produced by the enzyme induced by PCB. The amount of metabolites formed was calculated from the radioactivity of the peaks. The results obtained are given in Table 4.

Table 4. INCREASE OF OESTRADIOL METABOLISM BY PIGEON LIVER HOMOGENATES FROM BIRDS TREATED WITH VARIOUS CHLORINATED HYDROCARBONS

	Amount of polar metabolites formed in mμmoles
Control	29·3 ± 6·5
DDE (40 mg/kg)	76·2 ± 13·1
DDT (40 mg/kg)	93·1 ± 11·2
PCB (20 mg/kg)	160·0 ± 10·5

Each figure is the average with standard deviation of a group of four birds. In all cases 500 mμmoles of oestradiol-6,7-T (500 mCi/mmole) was present in the incubation mixture. Incubation time 30 min, weight of microsomal fraction used 300 mg. All chlorinated hydrocarbons were injected intramuscularly into the pectoral muscle 7 days before death.

Body concentrations of 40 p.p.m. of *p,p′*-DDE significantly increased the rate of oestradiol degradation by the induced enzymes in the experimental conditions. On a weight basis the PCB preparation had an oestradiol degrading potential approximately five times that of *p,p′*-DDE or technical DDT. Both DDE and PCB, which are apparently the most abundant of the chlorinated hydrocarbon pollutants in the global ecosystem, have therefore the capacity to produce sublethal physiological effects in birds.

Studies on the activity of induced enzymes in the rat at various times after a single injection of DDT or dieldrin have been made by Ghazal *et al.*[39]. He found that it took 70 days for the activity to fall to half its maximum value in the case of DDT and 15 days in the case of dieldrin. Experiments with dieldrin on pigeons

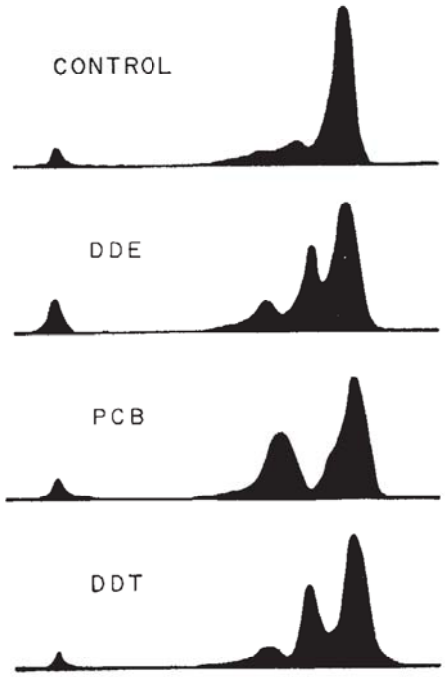

Fig. 1. Chromatographic separation of oestradiol and its metabolites. The large peak is unaltered oestradiol.

show that only a quarter of maximum activity remains after a month. Thus there is evidence that the effects of these induced enzymes can persist over a long period of time although more studies are needed to determine the steroid degrading potentials of livers of those species contaminated with chlorinated hydrocarbons. The profile of the metabolites should be some indication of the history of exposure to chlorinated hydrocarbons.

The reductions in eggshell thickness and eggshell weight increase the chances of egg breakage[21–24], and water retention, which affects hatching success[40–41], might be impaired. The environment in which birds now exist is therefore no longer the same as that in which they evolved; it is unlikely that any species has the genetic capacity to meet the selection pressures resulting from the abrupt environmental change which has produced the thin eggshells. The peregrine falcon is a species long highly revered and respected. G. H. Thayer[42] has described it as "the embodiment of noble rapacity and lonely freedom". An irony therefore exists in the fact that the peregrine may be the first species to be extirpated by global contamination.

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Tsunamis on the Moon?

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San Diego, California

The spacing of the five annular mountain rings around Mare Orientale fits a dispersion curve for gravity waves on a 50 km "liquid" layer overlying a rigid basement.

THE question whether the multiple ring-like mountain structures surrounding most of the lunar craters larger than 120 miles in diameter might be "frozen tsunamis", set in motion by the shock waves caused by impacting planetesimals, was first brought to my attention by R. B. Baldwin (personal communication). Baldwin points out that in several cases (including the giant Mare Imbrium) two or more rings can be made out

EXHIBIT I

FROM : W. H. Richard - Research Center

DATE : March 6, 1969

SUBJECT : AROCLOR WILDLIFE ACCUSATIONS

REFERENCE :

TO : E. Wheeler - EWHEE

cc H. Bergen HBERG
J. Springate JSPRT
W. Schalk WSCHA
D. Olson DOLSO
R. Kelly RKELL
J. Garrett JGARR
P. Hodges PHODG
P. Park PPARK
R. Keller JFQ
E. Tucker JFQ

Risebrough in a recent paper "Nature", Vol. 220, Dec. 14, 1968, has attacked chlorinated biphenyls in three ways:

(1) a pollutant - widely spread by air-water; therefore an uncontrollable pollutant.

(2) a toxic substance - with no permissible allowable levels causing extinction of peregrine falcon by induced hepatic enzymes which degrade steroids upsetting Ca metabolism leading to reproductive weakness, presumably through thinner egg shells.

(3) a toxic substance endangering man himself; implying that the peregrine falcon is a leading indicator of things to come.

As outlined in Science, Vol. 163, Pg. 548, Environmental Defense Fund (EDF) is attempting to write new legal precedents in conservation law by hearings and court action. In the Wisconsin case, water quality standards are at issue. "A substance shall be regarded as a pollutant if its use results in public health problems or in acute or chronic (injury) to animal, plant or aquatic life". Wisconsin is one of 7 states which now have federally approved water quality standards. According to Bern Wright, acting chief of the Federal Water Pollution Control Administration's Water Quality Standards Branch, DDT would fit the definition of a pollutant upon a showing that it is harmful to aquatic life.

These people in EDF are saying we must not put stress on any living thing through a change in air or water environment. Eagles, plant life, anything which lives or breathes. This group is pushing hard on the extension of the word harmful. They claim "enzyme inducer" activity is the real threat of DDT and PCB's and are using these arguments to prove that very small amounts of chlorinated hydrocarbons are "harmful".

Monsanto is preparing to challenge certain aspects of this problem but we are not prepared to defend against all of the accusations.

(a) Monsanto is preparing itself to identify trace ppb quantities of chlorinated biphenyls in water samples, in concentrated collected air samples, and in animal tissues. We will know whether we have been falsely identified and accused or not. We will eventually know where any pollution is taking place and the extent of the pollution.

MONS 096509

CV96-J-0440-E
DATE 04/02/01

PLFF EXHIBIT NO. 163

(b) We are not prepared to defend ourselves against the accusations made of enzyme and hormone activity, the isolation of enzymes or metabolic products, the indirect accusation of cancer, or the splitting of genes, when this accusation is made. Whether we can defend this route or not needs further discussion.

(c) Through the Industrial Bio-Test program we are to establish the long term allowable limits of chlorinated biphenyls for certain birds-fish-animals by feeding experiments, pathological examination, and tissue analysis for chlorinated biphenyls. We may be able to answer reproductive ability in some animals.

DDT has been under attack for some years because of its chlorine content, its persistent ability to be identified, and the wildlife problems attributed to it. We will still be under the same attack by the mechanisms listed in (b) even though we might establish safe operating limits for humans and certain animals.

Where does this leave us?

Under identification and control of exposure - we will be able to identify and analyze residues as well or better than anyone in the world. We will probably find residues other than DDT and PCB's. We will probably wind up sharing the blame in the ppm to ppb concentration level.

We can take steps to minimize pollution from our own chlorinated biphenyl plants, we can work with our larger customers to minimize pollution, we can continue to set up disposal and reclaim operations. We can work for minimum exposure in manufacture and disposal of capacitors, transformers and heat transfer systems, and minimize losses for large hydraulic users.

But, we can't easily control hydraulic fluid losses in small plants. It will be still more difficult to control other end uses such as cutting oils, adhesives, plastics and NCR paper. In these applications exposure to consumers is greater and the disposal problem becomes complex. If chlorinated biphenyl is shown to have some long term enzyme or hormone activity in the ppm range, the applications with consumer exposure would cause difficulty.

Risebrough has taken known Aroclor samples and claims to have evidence of enzyme and hormone change. Here there is no question of identification. Either his position is attacked and discounted or we will eventually have to withdraw product from end uses which have exposure problems. Since Risebrough's paper in "Nature", Dec. 1968 has just been published, it is timely, perhaps imperative, that this paper and its implications be discussed with certain customers. This is a rough one because it could mean loss of business on empty and false claims by Risebrough.

Well prepared discussions with Ind. Bio-Test, Monsanto biochemists, the medical and legal departments must take place now. The

position of DDT manufacturers should be determined as a guide. We are being accused of the same things attributed to DDT.

I have written this memo to clarify some of the issues. May I please have comments.

Thanks,

W. R. Richard

mm

Att.

EXHIBIT J

Monsanto

FROM (NAME & LOCATION) W. R. Richard - Research Center

DATE September 9, 1969

cc P. Hodges PHODG
M. Farrar Res. 1
H. Bergen HBERG

SUBJECT DEFENSE OF AROCLOR - F. FLORIDA

REFERENCE

TO : E. Wheeler - EWHEE

General Policy

Make the Govt., States and Universities prove their case, but avoid as much confrontation as possible. Comply and work with public officials to meet or exceed requirements ahead of time. Adverse publicity and competition are the real weapons.

Analytical for Aroclor { In Air - Which Aroclors are present? Where? / In Water - Which compounds / In Animals - interfere? } Govt. Agencie

Keep track of how much contamination - which sources.

Prove Bioharmful - Let Govt. prove its case, on case by case basis

Monsanto Visit-Govt. Biolabs - in search of toxicological experiments and evidence vs. Aroclors to keep up with progress.

Monsanto Prove Bioharmless - Limited work at Ind. Bio-test -

"Safe" toxic level for { man / mammals via Rats / Chickens / Fish } Seek evidence of Biodegradation
Question evidence against us.
Question shrimp toxicology especially other toxic chemicals.
If Aroclor bad, others must be worse.

Probable Outcome

We can prove some things are OK at low concentration. Give Monsanto some defense.

We can't defend vs. everything. Some animals or fish or insects will be harmed.

Aroclor degradation rate will be slow. Tough to defend against. Higher chlorination compounds will be worse ... lower chlorine compounds.

Therefore we will have to restrict uses and clean-up as much as we can, starting immediately.

DSW 014256

FORM REV 11-68

Therefore we will have to work for alternate products in end use applications; for Aroclor production facilities.

Clean Up Aroclors and substitute products where necessary and when required, before threats of publicity and competitive activity overwhelm us.

Water Pollution seems to be first issue

Aroclor product is refractive, will settle out on solids - sewerage sludge - river bottoms, and apparently has a long life.

Florida or Gulf Coast - Aroclor 1254 - Aroclor 1260 present issue.
40-200 ppb - causing problem at Pensacola (Monsanto) in plant effluent-causing " with shrimp.
- can't risk shut-down of plant.
Federal and State can extrapolate to other plants in Gulf area.

San Francisco - Aroclor 1254 and 1260
Reported Aroclor to be present in San Francisco Bay.
Reported to be thin egg shells in birds -
Lot of screaming -

Great Lakes Warf studies on DDT
Aroclor 1254 will be found!
Aroclor 1242 will be found?

Air Pollution - Possible spread - but less of an issue right now.
Analytical work more difficult.

Direct Contact with Product

Doesn't seem to be an issue - except for food heat transfer.

We don't believe Aroclor is being used as carrier for insecticide - sprayed around -

We are not positive but most uses are "closed" systems or products used in solid plastics, or adhesives, or sealants.

F. Fluids	Possible Pollution by Customers Plant Operation	Possible Pollut. by Customers Pro
Product		
Hydraulic Fluids	Yes, leakage external	Possible - See Johnson Motors Castings.
Air Compressor Fluids	Yes, leakage external	Leakage into produ
Heat Transfer	Yes, leakage external	Leakage into produ
Capacitor Fluids	Yes, leakage from plant - Scrap materials.	In product but closed for end use
Transformer Fluids	No, Should be clean. Yes, Reworked transformers	In product but closed for end use

* Capacitors can go to land fill dumps. Probably not burned, in Al containers.

** Need to take care of Aroclor in discarded transformers. Product could be drained and reworked.

Probable Conclusions

Hydraulic Leakage - Product could be caught at machines but will take a lot of clean-up work with customers. - Will have to have replacement product - with less-sensitive components. Work from this base on clean-up to prevent more pollution problems.

Air Compressor Fluids "

Hydraulic Fluids Must expect "shrimp" experiments, West Florida State, to be "aired" sometime soon; next few months.

This will lead to bad publicity and competitive action vs. all Pydrauls.

We will have to try to confine to Aroclor 1254 and Aroclor 1260.

We will have to take action before that time.

Gulf Coast -

Action W. Richard	Be able to replace Aroclor 1254 and Aroclor 1260 in Pydraul AC and 625 in 2 months time before Nov. 15, 1969.
Fallon/ Richard	Have trial product in hands of Gulf Coast accounts and distributor before Dec. 15.
Fallon	Suggest possible buy of "all phosphate" ester from Food Machinery. Use this as one trial fluid MCS___ for insurance.
Richard/	Suggest possible substitution of Aroclor 5442 for Aroclor 1254 in hydraulic and compressor blends. E. Wheeler judges lower order of toxicity and solubility for 5442 series. Have to test product in pump test for deposits.
Fallon/ Richard	Suggest field trials of our own all-phosphate ester.
Fallon/ Kuhn/ Kountz	Work with large customers to clean-up streams. Bring in Findett as mfg. partner in the recycle business. Get money out of recycle operations.

Inland-Waterways-

Wheeler/ Richard	Be close enough to Great Lakes studies to judge situation. Are there animals which are being affected by the concentrations found?
Richard	Be prepared to replace Aroclor 1254 and Aroclor 1260 in 4 months in hydraulic fluids and in air compressor fluids.
Richard	Be prepared to replace all Aroclor 1242 or 1248 in 6 months in hydraulic fluids. This means replacement of Pydraul 312 series, and control of sale of Aroclor 1248 to other hydraulic accounts such as Cities Service and Mobil.

DSW 014259

Heat Transfer

Fallon/ Roush/ Kountz	Systems will have some leakage depending strongly on engineering and maintenance. Need to work with customers on clean-up.
Fallon/ Roush	Need to replace FR especially in food or sensitive product areas where the product is getting into water. See dish washer compounds. See letter E. Wheeler to T. Fallon.

We have possible replacement products in Thermin... 55.
Thermi... 66.

Action		
Kuhn	Try to assure adequate production of Therminol 66 in face of decreased Aroclor production. H_2 and terphenyl supply may become short.	
	Switch customers to Therminol 55 or Therminol 66 ahead of pollution problems in customers plant.	
	Work with customers on plant and dumping practices.	
Kuhn/ Fallon	Findett already set up to rework. Need to make them a manufacturing arm. We get sale of recycle-rework fluid.	
Capacitor Fluids	Capacitor plants have re-purification and recycle systems but up to 5% of product can be lost by poor plant producers and off-quality material.	Capacitor products
Mkt. Benignus/ Bryant		Enclosed in Al or stainless steel for 5 to 25 year period.
Eng.-Kountz/ Mfg-Hodges	5% of production could be 1M lbs/year. This is a big loss for the type of pollution we are trying now to guard against.	Will ultimately have to dispose of capacitor products.
		Recommend we try to save this product for a time.
Action	Monsanto must start to work with capacitor people to clean up plant practices. We have set-up to accept material for rework into hydraulic fluid but this relocation is not a satisfactory solution. Material must be reworked to electrical grade or destroyed, whichever is more economical. Must start now to get control of off-grade material.	Recommend replacement of future Aroclor business with other products. Have 2 years.
Eng.,TSD-Plant Pollution Control		
Hodges/ Kountz		
Action	Monsanto must help plant clean-up of customer plants decantation, coalescing, adsorption, disposal of adsorbent or recycle of adsorbents. Monsanto badly needs "know-how" for clean-up.	
	Monsanto should seek Govt. contract money for clean-up research, (See MRC R. Binning, D. Nelson)	

DSM 014260

Transformers	Transformer Plant can operate in a clean, efficient manner with recycle of off-grade Aroclor.	Product transformer can remain closed & no exposure for [illegible]
Action Benignus/ Bryant	Should advise disposal of filter element materials so as to minimize chance of water pollution. Incinerate or dispose.	
	Reworked transformers pose a threat if the Aroclor is dumped into a water stream.	Should try to retai business by clean-u by education of cus tomers.
Action Benignus/ Bryant	Should try to minimize chance of dumping "old" fluid by re-working and by educating co. shops and collecting product for rework or disposal.	
	Dalton is set up in England to rework electrical grade fluid.	
Kuhn/Kountz Findett?	Need rework facility here + disposal scheme.	

Monsanto Plants

The Dept. of Interior and/or State authorities could monitor plant outfall and find ppm of chlorinated biphenyls at Krummrich or Anniston anytime they choose to do so. This would shut us down depending on what plants or animals they choose to find harmed.

Action - Take steps to see that every precaution is taken to prevent Aroclor entering water streams. Try to reduce to ppb level.

P.Hodges-TSD Engrg.-Kountz - Seek a Govt. contract on adsorption and incineration cycles - MRC.

Take samples of streams and river water and mud evidence for before and after clean-up. Samples can be stored for further analysis if we can't keep up current with analytical determinations.

Apply Monsanto clean-up methods to customer plant clean up equipment and procedures.

DSW 014261

Action - Engrg. & Mfg. Kountz and Kuhn

Evaluate liquid incinerators vs. solids handling incinerators for disposing of Aroclor and pentachlorophenol wastes. I estimate Aroclor disposal at 1-4M lbs/year, exclusive of cleaning up river bottoms or outfall bottoms.

Hydraulics	20% of 4M lbs	800,000 lbs
Heat Transfer	10% of 2M lbs	200,000 lbs
Capacitors	5% of 20M	1,000,000 lbs
Transformers	5% of 15M	750,000 lbs
		2,750,000 lbs

Central Eng. & Mfg TSD

Kountz & Kuhn

Set up an incinerator to handle Aroclor disposal - preferably one which will handle solids such as muds - slurries as well as liquids. Have in operation within 12 months. Ideally have incinerators available different sections for disposal.

Possible help from MRC

Chronic Toxicity Studies - Ind. Bio-Test

Wheeler Keller Ind.Bio-Test

Continue studies to establish FDA type limits of toxicity on Aroclor 1242, Aroclor 1254 and Aroclor 1260.

Rework with R. Keller-S. Tucker the number of samples which are to be analyzed for Aroclor in tissue. Try to see if Aroclors are changed metabolically. Does concentration level off, decline if feeding is stopped?

Institute studies against the most limiting biological parameters. If shrimp are the most limiting species for Aroclor levels of toxicity, then we will have to have biological studies on these species to confirm or deny adverse findings.

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DSW 014262

Biodegradation Studies

Swisher — Set up rate of biodegradation studies with Inorganic Div. on Aroclor 1242 vs. Aroclor 1254
Aroclor 5442 vs. Aroclor 5460
Chlorinated diphenyl ether
Chlorinated paraffin vs. chlorinated naphthalene
Chlorobromo Aroclors 1242 and 1248

Baxter
Lidgett
MCL — Contact Baxter and Lidgett at MCL regularly for results on Aroclor degradation. They are reported to be moving on laboratory experiments.

Establish contact with chlorophenol degradation studies of Cellu-Chem Group.

WRR

W. R. Richard

WRR:ms

Biodegradation Studies

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Chlorobromo Aroclors 1242 and 1248

Baxter Lidgett MCL — Contact Baxter and Lidgett at MCL regularly for results on Aroclor degradation. They are reported to be moving on laboratory experiments.

Establish contact with chlorophenol degradation studies of Cellu-Chem Group.

WRR

W. R. Richard

WRR:ms

EXHIBIT K

Elmer P. Wheeler, Medical Department

January 29, 1970

J. S. Barrett, [redacted]
[redacted]
W. B. Papageorge, [redacted]

Status of Aroclor Toxicological Studies

D. S. Cameron
Brussels

Enclosed is a copy of the reports from our consulting laboratory indicating the status of the animal toxicity studies. I have summarized the pertinent findings separately and as indicated in the table.

We have given copies of these data to one U. S. customer, the U. S. FDA and one or two other state agencies. I don't see why this information cannot be released with discretion in Britain or Europe.

Our interpretation is that the PCB's are exhibiting a greater degree of toxicity in this chronic study than we had anticipated. Secondly, although there are variations depending on species of animals, the PCB's are about the same as DDT in mammals.

We have additional interim data which will perhaps be more discouraging. We are repeating some of the experiments to confirm or deny the earlier findings and are not distributing the early results at this time.

Elmer P. Wheeler

EPW:ju

Enclosure

MONS 098480

EXHIBIT L

CONFIDENTIAL

MINUTES OF AROCLOR "AD HOC" COMMITTEE

First Meeting

Date: September 5, 1969

Present: M. W. Farrar
P. B. Hodges, Secretary
E. V. John
W. R. Richard
E. P. Wheeler, Chairman

Objectives: (Agreed to by the Committee)

Submit recommendations for action which will:

1. Permit continued sales and profits of Aroclors and Terphenyls.

2. Permit continued development of uses and sales.

3. Protect image of Organic Division and of the Corporation.

Background Discussion of Problem:

1. Agreed that we should concentrate on Aroclor 1254 and 1260. Aroclor 1242 has not yet been incriminated for these possible reasons:

   a. Nature of uses of 1242 minimizes environmental contamination.

   b. It may degrade biologically.

   c. Unless analytical techniques are performed carefully, 1242 can be destroyed by oxidation during the analyses.

2. PCB has been found in:

   a. Fish, oysters, shrimp, birds.

   b. Along coastlines of industrialized areas such as Great Britain, Sweden, Rhine River, low countries, Lake Michigan, Pensacola Bay, in Western wild life (eagles). It may be a global contaminant.

3. PCB has been tied to DDT in effects on disappearance of wild birds which have fish diets. Ratio of PCB to DDT has been about 40-50:1 generally. Dr. Reisboro reported almost 1:1 ratio. PCB may be contributing to or exaggerating the effects of other chlorinated aromatics.

MONS 030483

4. Sample acceptance from the numerous researchers was discussed. This has been done on a limited basis. Our corroboration of testing of their samples adds to our knowledge and demonstrates a willingness by Monsanto to help define the problem, but it is expensive and also tightens any possible legal cases against us--it rules out possibilities that Aroclors are not involved.

5. Toxicity levels:

Aroclors have been shown to be safe for man in reasonable exposure concentrations. We are testing 100 ppm in diet of rats and dogs on a rule-of-thumb basis that 1/100 of toxicity level is safe and 1 ppm is probably the upper limit in total diet.

"Allowable levels" are probably lower than DDT. The worst example to date is the test at Pensacola where 5 ppb was found to be toxic to shrimp in 18 days exposure.

One problem we are facing is to keep the "safe level" (?) for shrimp from being applied to e.g. Lake Michigan where more tolerant fish species probably exist. We need to show the safe level in shrimp, clams, oysters and several species of fish.

Many toxicity studies on PCB are underway and it was agreed to be desirable to keep contact with all laboratories which have requested Aroclor samples. One-half to two-thirds of the sample requests have come from state labs (who would let us know what they are doing) and about 1/3 have come from universities (who may give us the "brush-off"). Question of who should call on the laboratories was not resolved.

6. Escambia River Problem:

For a clearer understanding of the general problem, the situation at Pensacola was reviewed. From a relatively negligible discharge of 1-3 gal/day into a large river, 1/4 mile downstream levels of 42 ppb in water and 476 ppm in mud were found. Although use of Aroclor was halted immediately, we can expect the water contamination to continue for a lengthy period by leaching from the contaminated mud. No downstream samples have yet been taken to measure the decrease in contamination (as of 9/5/69).

7. Problem in Producing Plants:

P. Hodges reviewed what was being done to stop gross losses at Anniston and at WGK. Basically, the work to date consists of stopping or trapping any sewering of free Aroclor with return to process or land fill disposal of the trapped Aroclor. This will reduce levels in plant effluents to below solubility ranges, particularly as we move to install traps (or sumps) back into the waste source points where flows are small and as yet undiluted by Aroclor-free waste streams. The question of exactly how far to reduce (how much money to spend) is not yet clear and expenditures to date have been comparatively small. It was agreed that, until the problems of gross environmental contamination by our customers have been alleviated, there is little object in going to expensive extremes in limiting discharges from the plants.

One problem that has been interfering with logical development of our plant Aroclor waste reduction programs has been delays in obtaining analytical results from in-plant and ex-plant sampling. It was agreed that additional help was necessary in Dr. Tucker's lab but no specific actions were proposed. In addition to in-plant work, the plants are sampling the receiving streams.

Air pollution reduction has not been considered by the plants to date except as incidental prevention of product contamination during tank car and drum loading operations. Long range (1-2 year) improvements at Anniston are planned to reduce product contamination (and air emissions) in car loading operations. It was agreed that a comprehensive air sampling and testing program would be very expensive and is probably not justified at this stage of the problem.

8. Environmental Contamination by Customers:

Our in-plant problems are very small vs. problems of dealing with environmental contamination by customers. In one application alone (highway paints), one million lbs/year are used. Through abrasion and leaching we can assume that nearly all of this Aroclor winds up in the environment.

Because the rate of natural (bio-degradation) is very low, other degradation must destroy PCB equal to the rate of environmental exposure in order to avoid build-up of contamination.

A general discussion was held on philosophy of controlling sales or working with customers to prevent pollution by PCB.

Action Planned:

Each member of the group will submit to the other members for consideration possible ideas and programs to help accomplish the overall objectives set by the Committee. Following review of the suggestions, the Committee will meet again at an early date to be arranged by the Chairman.

P. B. Hodges
Secretary

:ju

EXHIBIT M

CONFIDENTIAL

Date: October 2, 1969

Subject: REPORT OF AROCLOR "AD HOC" COMMITTEE

To: Howard S. Bergen, Jr.
James E. Springate

From: M. N. Farrar
P. B. Hodges, Secretary
E. V. John
W. R. Richard
E. P. Wheeler, Chairman

CONTENTS

Summary of the Problem

on August 25,

OBJECTIVES

At a meeting of business group directors of Function Fluids and Plasticizers with Organic Division and Corporate Staff members, an "ad hoc" committee was appointed to prepare a resume of the situation concerning the environmental contamination through the manufacture and use of polychlorinated biphenyls (Aroclors).

The objective of the committee was to ~~propose~~ recommended actions that will:

1. Protect continued sales and profits of Aroclors;

2. Permit continued development of new uses and sales, and

3. Protect the image of the Organic Division and the Corporation as members of the business community recognizing their responsibilities to prevent and/or control contamination of the global ecosystem.

PROBABILITY OF SUCCESS

The committee believes there is little probability ~~(illegible)~~ that any action that can be taken will prevent the growing incrimination of specific polychlorinated biphenyls (the higher chlorinated--e.g. Aroclors 1254 and 1260) as nearly global environmental contaminants leading to contamination of human food (particularly fish), the killing of some marine species (shrimp), and the possible extinction of several species of fish eating birds.

Secondly, the committee believes that there is no ~~possi~~ practical ~~ble~~ course of action that can so effectively police the uses of these products as to prevent environmental contamination. in order completely some

There are, however, a number of ~~possible~~ actions which must be undertaken to prolong the manufacture, sale and use of these particular Aroclors as well as to protect the continued use of other members of the Aroclor series.

The ultimate that can be expected is the continued use of the lower chlorinated biphenyls (Less than 5 Chlorines) and the chlorinated terphenyls in applications amenable to such control that there is practically zero losses to the environment. In the interim we would hope to establish by appropriate research efforts "tolerance" or safe levels for particular Aroclors in the environment.

- The identification is ~~poor~~ positive
- Toxicity towards certain species is high.
- Persistance is high.
- Likely hood of natural origin or degradation is remote.

RECOMMENDATIONS

OK 1. In view of legal and moral considerations, notify all Aroclor 1254 and 1260 customers of environmental contamination problem. + advising customers.

3, ~~2~~. Consult with appropriate federal agencies' headquarters in Washington to determine current status of concern and to inform appropriate individuals therein of Monsanto's research and control efforts.

4, ~~3~~. Personally contact all governmental and university laboratories which have requested Aroclor samples and indicated interest in the environmental contamination problem.

2, ~~4~~. Reduce losses of Aroclors in liquid wastes from Monsanto plants to ~~absolute~~ minimum. Goal ~~0~~ to 25 ppb. For 1254 & 1260.

5. Determine extent of atmospheric losses from Aroclors from Anniston and WGK Plants and develop plans for control.

6. Analyze in Organic Division laboratories (or by contract) selected appropriate samples from:

   a. Environment of Anniston and WGK Plants.

   b. Monsanto products where contamination is possible.

   c. Agencies and/or laboratories attempting to pinpoint specific sources of contamination.

   d. Customer plants' environments.

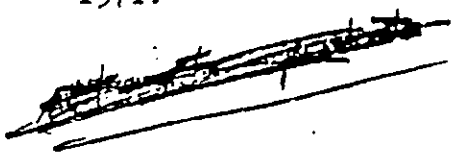
   e. Research efforts involved in biological studies--i.e. animal, bird and fish toxicity studies and biodegradation studies.

7. Expand analytical capabilities in conjunction with items 5. and 6. above.

RECOMMENDATIONS (Continued)

8. Assign one individual from the division full-time for three to six months to coordinate division and Corporate Staff department efforts.

9. Establish special budgetary account to allow implementation of these recommendations and the continuation of the toxicological research effort now underway and continuing until June, 1971.



BASIS FOR RECOMMENDATIONS

1. Notification of All Customers

Feb.

On ~~September~~ 24, 1969 the San Francisco Chronicle published a "scare" story following an interview with Dr. Robert Risebrough of the University of California. The latter had recently published in Nature the finding of polychlorinated biphenyls in fish, birds and eggs in the California coastal areas.

On March 3, 1969, the Functional Fluids group sent a letter to the 31 major Aroclor customers in the transformer and capacitor applications. The letter included a copy of the Chronicle story and a Monsanto statement concerning the situation. This was intended to announce to these customers that the polychlorinated biphenyls might be in trouble and implied that the customers should make every effort to prevent loss of these materials to the environment. There has been subsequently some follow-up with at least General Electric and Westinghouse.

It has been recognized from the beginning that other functional fluid uses could lead to losses of the Aroclors to liquid waste streams from the customers' plants. Losses could occur from spills, unusual leakage of large volumes and daily losses of smaller volumes.

It has also been recognized that there could be vapor losses but it has been felt that these were perhaps of less significance than the vapor losses in plasticizer applications. The concern for vapor losses rises from the published proposed theory that even minute quantities of vapors are eventually transferred to the water environment and accumulated therein.

Another possible source of air environmental contamination is the eventual destruction of materials which have Aroclors in them. Of particular significance might be the burning or partial incineration of waste or used products containing the Aroclors.

BASIS FOR RECOMMENDATIONS (Continued)

As the alarm concerning the contamination of the environment grows it is almost certain that a number of our customers or their products will be incriminated. The company could be considered derelict, morally if not legally, if it fails to notify all customers of the potential implication.

A case in point is the recent determination (mid-~~August~~ sept.) that milk to be marketed by the Maryland Cooperative Milk Producers, Inc. in Baltimore was contaminated with polychlorinated biphenyls. The source of the PCB's was isolated to six dairy herds in Martinsburg, West Virginia. Investigation by the Producers Association is continuing but to our knowledge the specific source of the PCB has not been pin-pointed.

When the Aroclors were indited as causing poisoning in cattle in the mid-1950's, chlorinated naphthalenes were eventually identified as the causative agent. The naphthalenes were used in greases or lubricants for cattle feed machinery and had contaminated the animal food. (Members of the Medical Department have been told that the Texas company "bought" 6,000 head of cattle around the country as a result of this incident. It is not known whether or not the suppliers of the naphthalenes to Texaco were brought into the settlement.) Are our customers selling grease or lubricants containing Aroclors that are now responsible for the milk contamination?

In the plasticizer use area, the Aroclors may be used in rubber based paints or surface coatings. The uses for these surface coatings include the interior walls of potable water supply storage tanks in some communities. In Europe we have been told that similar paints are widely used for swimming pools. In spite of the low degree of solubility of the PCB's in water, there are sentiments among the European scientists (and our PCB competitive manufacturers) that such uses may be sources of pollution.

Other customer applications or uses which could be suspect include highway marking paints, ~~and~~ any of the oil and/or grease lubricant applications, caulking compounds - sealants,

BASIS FOR RECOMMENDATIONS (Continued)

2. Consultation with Federal Agencies

In August of 1968 when the current effort related to this problem got underway, the scientists at the U. S. Department of Interior, Fish and Wildlife Laboratories at Paturent, Maryland were visited. In the six to twelve months that the laboratory had been looking for PCB residues, they had identified such compounds in dead eagles as well as marine birds. At that time they did not report positive findings in fish, shell fish or other marine organisms. We know that their efforts have been continuing at an accelerated rate but the laboratory has not been revisited to learn of current developments.

The U. S. Food and Drug Administration in Washington called Dr. Kelly in June to report that the State of Georgia had found PCB's in milk (we had in April supplied samples of our Aroclors to the Georgia State Department of Agriculture Laboratories in Atlanta).

The analyses of milk from the Maryland co-op mentioned in 1. above were performed by an FDA laboratory.

On Friday, September 26, we were asked to send samples to the Atlanta Toxicological Branch of the FDA and to the Residue Chemical Branch Division of Pesticides, FDA in Washington. The stated reason for the request was for these laboratories to determine the "acute toxicity" of Aroclors 1254 and 1260.

In the past year we have had request for samples from five or six of the regional laboratories of the Federal Water Pollution Control Administration--an agency within the U. S. Department of Interior. We have not had an opportunity to follow-up with these laboratories as to their interest or concern.

In August a laboratory of the Bureau of Commercial Fisheries, Department of Interior, at Pensacola, Florida, reported finding PCB's in the river below our Pensacola Plant. Subsequently, they reported that 5 parts per billion of Aroclor 1254 killed baby shrimp in 18 days. There has been no follow-up by St. Louis based personnel since our Pensacola Plant discontinued the use of Pydraul AC.

BASIS FOR RECOMMENDATIONS (Continued)

Appropriate individuals in the parent federal agencies should be visited to determine their current activities and concern and, secondly to make these agencies aware of Monsanto's interest, research and control efforts.

3. Contact with other Governmental and University Laboratories

In addition to the above, Monsanto has provided samples of the Aroclors to 30 or 40 other governmental and university laboratories or scientists. It would be prudent and appropriate for someone from Monsanto to personally follow-up the supplying of the samples and determine the status of the efforts of these groups. For example, the State Department of Agriculture Laboratory in Hartford, Connecticut reported in July that they had found PCB in fish off the coast of Connecticut. This led to two articles in the Hartford Times and a five minute radio program through a syndicated outlet of 108 radio stations.

4. Losses from Monsanto Plants

Efforts to reduce the losses of Aroclors in liquid wastes from the Anniston and WGK Plants are completed or underway. It is impossible to establish a limit as to what can be discharged "safely". Investigation has shown that the waters in receiving streams below the Anniston Plant contain significant (parts per million) concentrations of PCB. More ominous perhaps is the fact that sediment in the bottom of these streams miles below our plants may contain up to 2% Aroclor.

To prepare for the eventual publication in the press of the discharge of PCB's in Alabama and to the Mississippi River, a significant effort must be made to determine the present levels of contamination and more importantly, determine the levels of contamination as "clean up" procedures begin to show an effect.

The incident at the Monsanto Plant at Pensacola indicates that all Monsanto Plants using Aroclors should be made aware of the potential problem and efforts made to eliminate any losses. The significance of "any losses" may be related to the one to three gallons per day which was being lost at the Pensacola Plant.

BASIS FOR RECOMMENDATIONS (Continued)

Hopefully research efforts will indicate that a "safe level" of losses would be higher in fresh water streams not adjacent to coastal estuaries. At the present time we know of no claims that the PCB's are "destroying" fish.

5. Atmospheric Losses at Anniston and WGK

The determination of atmospheric losses for our Aroclor manufacturing plants will be more tedious and time consuming than in the case of liquid wastes. We will never be prepared to discuss intelligently potential problems of our customers where there may be atmospheric losses until we have some data on our own plants. This is particularly true if we ever expect to recommend to our customers measures for control of atmospheric losses.

6. Analytical Capabilities (a. through e. inclusive)

In each of the recommendations 2. through 5. above, there is the implication that Monsanto's best interest could be served by appropriate sampling and analysis. In connection with any of the governmental and other laboratories, we must accept their reported analytical results or in specific instances offer to run duplicate analyses to confirm for ourselves the validity of the reported results.

The committee agrees that to perform analyses that would confirm all of the reported findings represents an unreasonable cost in terms of personnel and facilities. At the same time there appears to be no alternative to the acceptance in the last three months that confirmation analysis in selected cases should be done. This has led to an accumulation of a backlog of samples which need attention. Delays in analysis are occurring because of shifting priorities for samples as they are received or as they have been retained.

A case in point is the delay in analyzing thirteen samples from the Inorganic Division. Samples were submitted following the finding that five of five commercially available electric dishwashing compounds analyzed showed the presence of PCB's. The Inorganic Division can not exonerate the products it sells to the detergent manufacturers until it has some data showing whether or not Monsanto supplied materials are contaminated. In the meantime Inorganic Division Quality Control has

BASIS FOR RECOMMENDATIONS (Continued)

suggested to its Division Engineering that future designs for making detergent components insure that the use of Aroclors will not permit contamination. Secondly, it is obvious that the Division cannot approach its detergent manufacturing customers about their potential problem until the above data indicate that "our own skirts are clean".

This week it was agreed that milk and water samples from the Maryland co-op in Baltimore should take precedence over other samples which had been scheduled.

In summary, the committee believes there will be a growing number of samples from the following:

a. Environment of Anniston and WOK Plants.
b. Monsanto products where contamination is possible.
c. Agencies and/or laboratories attempting to pin-point specific sources of contamination.
d. Customer plants' environment.
e. Research efforts involved in biological studies--i.e. animal, bird and fish toxicity studies and biodegradation studies.

7. Expansion of Analytical Capabilities

The recommendation to expand the analytical capabilities is a necessity in view of the preceding recommendations.

8. Assignment of Full-Time Effort

Up to this time the coordination of the Division effort has been principally the responsibility of W. R. Richard and E. P. Wheeler with support from R. E. Keller and Cumming Paton. Each of these individuals has other responsibilities to the extent that, although the Aroclor problem may have been a predominant issue, other areas of interest could not be slighted.

The committee believes that the problem is of sufficient seriousness to warrant the full concentration of at least one individual for the next three to six months. Those who have been involved up to this point would obviously continue in their

BASIS FOR RECOMMENDATION (Continued)

supporting efforts where the individual's background or expertise would make it appropriate. For example in connection with the follow-up with the federal agencies in Washington, Dr. Kelly would expect to be present for any contact with USFDA officials.

Other members of the Medical Department would be made available for contacts with the pollution control agencies or those laboratories or universities where toxicity appears to be of interest or concern.

Certainly Dr. Keller and Scott Tucker should accompany anyone making visits where the specific question of analytical techniques was to be discussed.

This still leaves a number of man months to be devoted to the other laboratories or agencies which have up to this point not made their specific interest known.

Equally if not more important is the effort which must be made relating to the contacts with customers. The committee does not believe that this can be handled by district marketing representatives without supplying such "local" individuals with a complete background of the problem.

9. Budgetary Considerations

The committee recognizes the restrictions placed on those currently involved by mandates to operate within normal or proposed reduced budgets. It should be clear, however, that the product groups, the Division and the Corporation are faced with an extraordinary situation. There can not be too much emphasis given to the threat of curtailment or outright discontinuance of the manufacture and sales of this very profitable series of compounds. If the products, the Division and the Corporation are to be adequately protected, adequate funding is necessary.

EXHIBIT N

Monsanto

(M (NAME & LOCATION)) N. T. Johnson St. Louis

DATE February 16, 1970

SUBJECT POLLUTION LETTER

REFERENCE

TO

P. Craska - Wilmington
C. Clay - St. Louis
J. H. Davidson - Los Angeles
R. A. Damiani - Chicago
G. F. Fague - Detroit
R. A. Garcia - Akron
R. Garnsworthy - Melbourne
J. A. Heilala - Akron
R. Irwin - Houston
J. S. Pullman - New York
J. J. Roder - Chicago
R. Giles - Melbourne

cc:

P. J. A. Marsh - Brussels
R. Enrhardt - New York
T. W. Oneson - Montreal
J. N. Haggart - Brussels
V. Morse - St. Louis
J. Brydon - Montreal
R. Graham - New York
P. G. Benignus
J. G. Bryant
D. E. Roush
J. R. Fallon
D. A. Hall
D. R. Pogue
D. F. Smith
D. A. Olson

Attached is a list of questions and answers which may be asked of you by customers receiving our Aroclor-PCB letter. You can give verbal answers; no answers should be given in writing. If the customer asks a question you can't answer or if he wants an answer in writing, then send his questions to me and we will answer from here.

We want to avoid any situation where a customer wants to return fluid. The new reformulated products will be available within a month. We would prefer that the customer use up his current inventory and purchase Pydraul 625A, Pydraul ACA, Pydraul ACA Winter Grade and Pydraul 540A when available. He will then top off with the new fluid and eventually all Aroclor 1254 and Aroclor 1260 will be out of his system. We don't want to take fluid back. Sell him the replacement.

We must be very positive in our approach with each customer relative to our decision to eliminate the use of Aroclor 1254 and Aroclor 1260 in our Pydraul products. We (your customer and Monsanto) are not interested in using a product which may present a problem to our environment. We certainly have no reason to be defensive or apologetic about making this change. The decision to change makes good sense and our customers should commend us, not criticize our actions. No one has forced us to make this

change. We have done it to keep our customers out of possible trouble. They should appreciate our effort, and stay with us as a customer on the reformulated Pydrauls. To make this change has cost us research monies and time. Fortunately, we possess the technical skills to make a change in our formulations without affecting the performance of products. Be positive, Take the offense. Don't let a customer or competitor intimidate you. I doubt if our competitors know whether their product could present a problem to our environment. You might ask your customer, if he has ever asked Houghton or Stauffer, Carbine, etc. about the effects of their products.

We should also recognize (point this out to your customer) we must clean-up. The Chemical Week article gives him an idea of laws in effect in his state. Read this yourself. Be familiar with the data on each state in which your customers are located. Use this in your discussions.

We have no replacement products for Aroclor 1254 and Aroclor 1260. We will continue to make these products; however, customers will have to use their own judgement on continued use.

We can't afford to lose one dollar of business. Our attitude in discussing this subject with our customer will be the deciding factor in our success or failure in retaining all our present business. Good luck.

(We have also attached a copy of the letter sent to transformer customers.)

N. T. Johnson

lb

EXHIBIT O

bcc: W. R. Richard
Tom Ford
H. S. Bergen
J. E. Springgate

March 24, 1969

Mr. Harry Chatfield
Los Angeles County Air Pollution
Control District
434 South San Pedro Street
Los Angeles, California 90013

Dear Mr. Chatfield:

Enclosed is a copy of the physical properties of our Aroclor compounds I promised you by phone. We have added the oral and skin absorption toxicity to the bottom of this list to give you some idea of the relative toxicity of these compounds. You will notice that they are not particularly toxic by oral ingestion or skin absorption. In addition, I have enclosed a copy of a paper that was printed in the American Industrial Hygiene Association quarterly in June, 1956. This paper discusses the vapor toxicity of Aroclor 1242 and Aroclor 1254. As I told you on the phone the 12 prefix in this case means biphenyl and the 42 or 54 suffix in this case represents 42% and 54% chlorine by weight, respectively.

We at Monsanto cannot understand the origin of the materials reported in the recent newspaper articles on the West Coast. These compounds are utilized generally in enclosed systems and very little would normally be expected either in the air or in the liquid discharges from a using industry.

If we can provide you with any additional data we would be glad to do so.

Sincerely,

Jack T. Garrett
Manager, Pollution Abatement
and Industrial Hygiene

JTG:cjs
Enclosures

EXHIBIT P

Monsanto

ORGANIC CHEMICALS DIVISION

Monsanto Company
800 N. Lindbergh Boulevard
St Louis, Missouri 63166
Phone. (314) 694-1000

March 27, 1969

Mr. Fred H. Dierker
Executive Officer
State of California-Resources Agency
San Francisco Bay Region
Regional Water Quality Control Board
364 Fourteenth Street
Oakland, California 94612

Ref: File No. 2119-1075

Dear Mr. Dierker:

This letter is written in response to your letter dated March 7, asking several questions concerning poly-chlorinated biphenyls ("PCB") manufactured by Monsanto. Responses to each of your questions are set forth below, numbered in accordance with your letter.

1. We have recently contracted with a consulting laboratory to undertake fish toxicity studies on PCB's. Because of the low solubility of PCB in water, it may be difficult to obtain a 96-hour TL_m. Depending upon the results of the initial studies, we may conduct 30-day exposure experiments.

2. Attachment A shows the general physical characteristics of PCB. Information set forth on the bottom of these pages shows the results of acute animal toxicity studies showing the oral LD_{50} in rats and the minimum lethal skin dose when applied to rabbits. You will note that these results were obtained using un-diluted samples or as a corn oil suspension solution depending on the viscosity and solubility of the materials.

3. & 5. Attachment B shows the results of studies of chronic inhalation. You will note in the table describing the properties of various PCB's that the liquid materials have extremely high distillation ranges and that waxy or resinous materials have to be distilled under high vacuum. These data attest to the low vapor pressure of the materials at ambient temperatures.

PCB finds primary use in applications requiring chemical stability, good dielectric properties, fire resistance, low volatility and water insolubility. When used in dielectric fluid, PCB is hermetically sealed in capacitors and transformers, designed for 20 to 30 years life at temperatures at or near ambient temperatures.

Plasticizer PCB is found primarily as a plasticizer for surface coatings such as corrosion resistant paints, industrial adhesives and as a sealant such as window sealants. These applications do not include automobile tires, or floor tile. These applications of PCB emphasize its inertness and low volatility to provide long service life for the product without loss of flexibility. In normal use, PCB plasticizer applications are ambient temperature environments presenting no special health problems. In view of PCB's chemical inertness, we would anticipate no problems associated with the environment from refuse dumps.

PCB finds further application in industrial (excluding aviation) hydraulic and heat transfer systems. As in the case of dielectric applications, these systems are designed for essentially indefinite fluid life.

4. PCB is essentially insoluble in water, which is a property valued for most of its industrial applications. The solubility of PCB varies with the number of chlorine atoms. Solubility in tap water at 25°C. is as follows:

Material	Solubility in Water
PCB - (42% chlorine by weight)	203 ± 10 ppm
PCB - (48% " " "	106 ± 14 ppm
PCB - (54% " " "	50 ± 2 ppm

This data indicates that the most highly chlorinated PCB's are the least soluble in water. Annual consumption in the Bay Area is less than 500,000 pounds for all PCB applications.

6. It is a long standing policy at Monsanto not to disclose information concerning our customers, including the customer's name. However, we desire to cooperate with you to the fullest extent practicable in this matter. Should you desire to visit typical PCB users we will be happy to approach our customers to arrange a visit.

7. We advise persons using PCB products to take normal precautions associated with handling most synthetic materials. If accidentally spilled on hands, no serious skin irritation should occur. However, PCB has a solvent action (similar to paint thinner) on the fats and oils of the skin and prolonged contact may lead to drying and chapping of the skin.

In the event of contact, the skin should be washed with soap and water. Saturated clothing should be removed and dry cleaned. Spills may be cleaned up with rags, sawdust or absorbent clay. Eye contact may result in painful irritation but should cause no permanent damage to tissues. In the event of eye contact, the eye should be flushed with large amounts of water. As with all eye first-aid, a physician should be consulted. To relieve irritation, physicians have used a 1% Pontocaine as well as ophthalmic cortisone acetate solution, or castor oil.

Infrequent exposure to PCB vapor should not cause ill effects. However, prolonged exposure to high vapor concentrations should be avoided.

After many years of experience with PCB, it is our understanding that cases of harmful effects resulting from the industrial use of PCB have been extremely rare. We believe this is due largely to low volatility which reduces possible inhalation at ambient temperatures.

We sincerely trust that this answers the questions contained in your letter. As further information becomes available in which we feel you might be interested, we will pass such information on to you.

Yours very truly,

for Howard S. Bergen
Director, Functional Fluids

HSB:pep
Attachments
BCC: P. S. Park
E. Wheeler/J. Garrett
D. A. Olson
P. Benignus
W. Waychoff
D. Pogue
N. T. Johnson
W. R. Richard

EXHIBIT Q

Monsanto

JUN 2 1969

FROM (NAME & LOCATION): E. P. Wheeler

DATE: May 26, 1969

SUBJECT:

REFERENCE:

TO: W. R. Richard

cc: R. E. Keller
E. S. Tucker
H. S. Bergen
J. E. Springgate
C. Paton
W. A. Kuhn
P. B. Hodges
Dave Nelson - MRC

Dave Nelson of MRC called me today to relay the following information:

1. A Mr. Bob Day in the Cincinnati Laboratories of the National Air Pollution Control Administration had called him and asked for any information Monsanto might have relating to what might happen to chlorinated biphenyls in products that might be incinerated. Day indicated that he needed the information for "his boss" John Ludwig, assistant commissioner of NAPCA in Washington by Monday, May 26.

   After trying to reach Day and finding busy circuits I called John Ludwig directly since I know him personally. Ludwig was surprised and said if the question of PCBs had come up he had forgotten it or at least didn't remember that he wanted an answer by next Monday. He offered to have Day call me directly but I told him that I would get through to Mr. Day.

   I did reach the latter and after much discussion it turned out that some member of Congress had sent a letter directly to the NAPCA offices in Washington asking what NAPCA knew about distribution of PCBs by incineration and Ludwig had passed the letter on to Cincinnati to get information for a reply.

   Mr. Day was under the same misconception as so many others concerning the widespread situation of PCBs in such things as automobile tires. I set this matter straight quoting from the company prepared statement. We then got into some detail because it became apparent that Day was not a "Knight on a White Horse" but was reasonable and objective. As we chatted further and expanded comments about mutual acquaintances, Day finally told me that he is a Monsanto employee from Pensacola fulfilling his millitary commitment as a member of the Commission Corps. in the Public Health Service.

   He indicated that the laboratory in Cincinnati may try to set up a program where waste materials containing PCBs will be incinerated (in one of the several experimental incinerators which they have there) and analyze the decomposition products. He asked if Monsanto would be in a position to provide wastes or

plastic materials containing Aroclor which they could use in their experiments. I offered to cooperate in any way we could.

He will send word back to Washington which will then be related to the member of Congress that the PCBs are not used in some of the applications which have been indicated in the public press and in general try to present Monsanto's views to wit: "We can not conceive how the PCBs can be getting into the environment in a widespread fashion and that the company is actively involved in research programs to try to shed some light on the situation."

2. Dave Nelson attended a meeting at the Federal Water Pollution Control Administration Laboratory in Athens, Georgia recently to see if there were areas where MRC could bid on government grants for research in connection with pesticide residues.

Dave says that in the course of the meeting some of the FWPCA boys raised the question as to what Monsanto at Anniston, Alabama does to control the escape of polychlorinated biphenyls or waste products getting out of the plant. Obviously Dave would not have any of the details of our programs at Anniston but passed this word on to me with the thought that we can anticipate that the Peds will be looking at creek, river or lake water and mud samples below Anniston for PCBs.

EPW

Elmer P. Wheeler

cs

EXHIBIT R

July 23, 1969

Mr. A. Bruce Pyle
Assistant Bureau Chief
Department of Conservation
and Economic Development
P. O. Box 1809
Trenton, New Jersey

Dear Mr. Pyle:

In connection with your recent request for more specific information on PCB, I have enclosed several items that may be of interest.

The first is a table showing the physical characteristics and properties of our Aroclors, the trade name for our polychlorinated biphenyls.

The numerical designation of these materials is meaningful. The 1200 series are biphenyls chlorinated to the extent indicated by the last two numerals. For example, Aroclor 1242 is biphenyl chlorinated to the extent of 42%; Aroclor 1254 is biphenyl chlorinated to 54%.

The 5400 series are terphenyls chlorinated to the extent of the last two numerals. Thus Aroclor 5460 is terphenyl chlorinated to 60%. The 2500 and 4400 materials are mixtures of biphenyls and terphenyls chlorinated to 65%.;

We have typed on the bottom of the table the results of acute toxicity studies. These indicate the approximate lethal dose in rats when administered orally and the minimum lethal dose when the samples were applied to the unbroken skin of rabbits. You will note that the samples were administered undiluted or as various concentrations in corn oil depending on the physical form and solubility of the sample.

The second enclosure refers to the only published data that we now have concerning possible toxicity to fish. This enclosure is a 1957 report from the U. S. Fish and Wildlife Service showing the results of studies to determine the possible effects of chemicals to larval lampreys and fishes. The enclosure includes a copy of the title page, the page explaining the table and that portion of the table which indicates that four of the Aroclors have no effect on trout, bluegill and larval lampreys at a concentration of 5 ppm in a 24 hour test period.

The only chronic toxicity data that we have refers to the inhalation of vapors of Aroclor 1242 and 1254. Enclosure three is a reprint describing the chronic inhalation studies and enclosure four is a Hygiene Guide published by the American Industrial Hygiene Association which prescribes safe handling techniques for the use of these materials in industry.

Based on available data, manufacturing and use experience, we do not believe the polychlorinated biphenyls to be seriously toxic. At the same time we have also recommended precautions to avoid repeated and prolonged skin contact and secondary avoidance of inhalation of vapors when the materials are heated. As indicated by the distillation ranges in enclosure one, these products have extremely low vapor pressure and thus present little vapor inhalation hazard at ambient temperatures.

I don't know that I can add a great deal to your question to the use of these materials without repeating the comments in the statement which Tom Ford sent you. Their dielectric characteristics lead to usage as insulating fluids for transformers and capacitors. Transformer application is in sizes applicable to sub-stations rather than the small transformer on lines for reducing voltage for household use.

The plasticizer type application PCB's are incorporated into a polymer as an integral part of the solid material. This is the case whether the polymer is then used as an adhesive special elastomer or individual surface coating.

Contrary to some reports from the press, the PCB's are not used in rubber tires, lipstick, or the common plastic containers or films used for industrial or household packaging.

We have a considerable research effort underway to determine the toxicity of several of the PCB's in rats and dogs. We are also including three generation reproduction studies in rats. Also underway are studies with fowl to determine the possible chronic effect on the birds themselves, egg size and production, hatchability of the eggs and viability of the chicks. We will also do studies to determine any possible effect on egg shell thickness and calcium and phosphorus metabolism.

We have attempted to establish a program for determination of the possible biodegradation of the polychlorinated biphenyls but research of this type is not yet underway.

Re-emphasizing a point we attempted to make in the statement Tom sent you, we are unable at this time to conceive of how the PCB's can become wide spread in the environment. It is certain that no applications to our knowledge have been made where the PCB's would be broadcast in the same fashion as the chlorinated hydrocarbon pesticides have been. I am sure there will be much more research undertaken to clarify some of the questions that early research efforts have raised and you may be sure that we will participate in a number of these.

If I can be of any further assistance after you have reviewed this letter and the enclosures, please let me know.

Sincerely,

Elmer P. Wheeler
Manager, Environmental Health

EPW:ju

EXHIBIT S

Tax ID 01270610230003 Printed 08/09/2016 Card No. 1 of 1

UNION HIGH SCHOOL DIST 402
HILL & KELSEY ST
MONROE, WA 98272

SEC 01 TWP 27 RGE 06S1/2 SE1/4 SW1/4 NE1/4 LESS W 30FT FOR ST PER AF 9001110281
V 2299 P 941

Neighborhood Number
5105001

Neighborhood Name
City of Monroe secondary com

TAXING DISTRICT INFORMATION

Jurisdiction Name	Snohomish
Area	001
Corporation	103
Section & Plat	0
Routing Number	2706011

Transfer of Ownership

Site Description

Topography

Public Utilities
Water, Sewer, Electric

Street or Road
Paved

Neighborhood

Zoning:

Legal Acres:
4.2900

Valuation Record

Assessment Year		2010	2011	2012	2013	2014	2015	2016
Reason for Change		Reval	Reval	Reval	Reval	Reval	Reval	Reval
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	I	6593900	6593900	6593900	6593900	6593900	6593900	6593900
	T	7995400	7808600	7715100	7715100	7715100	7715100	7808600
0	L	0	0	0	0	0	0	0
	I	6593900	6593900	6593900	6593900	6593900	6593900	6593900
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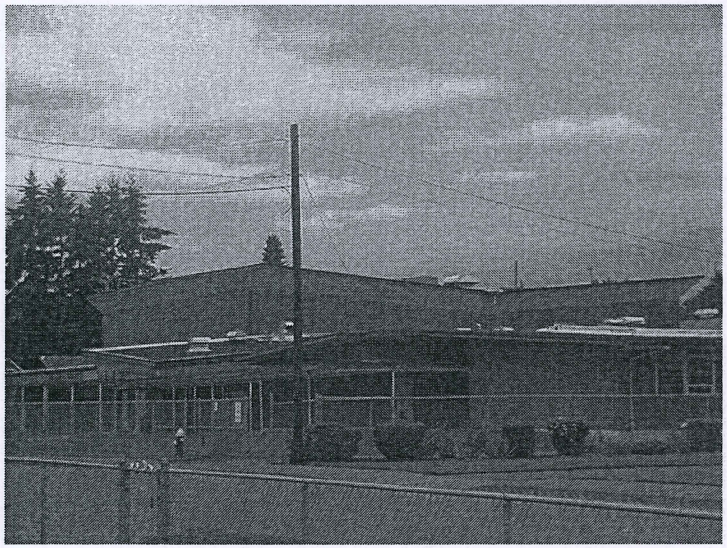
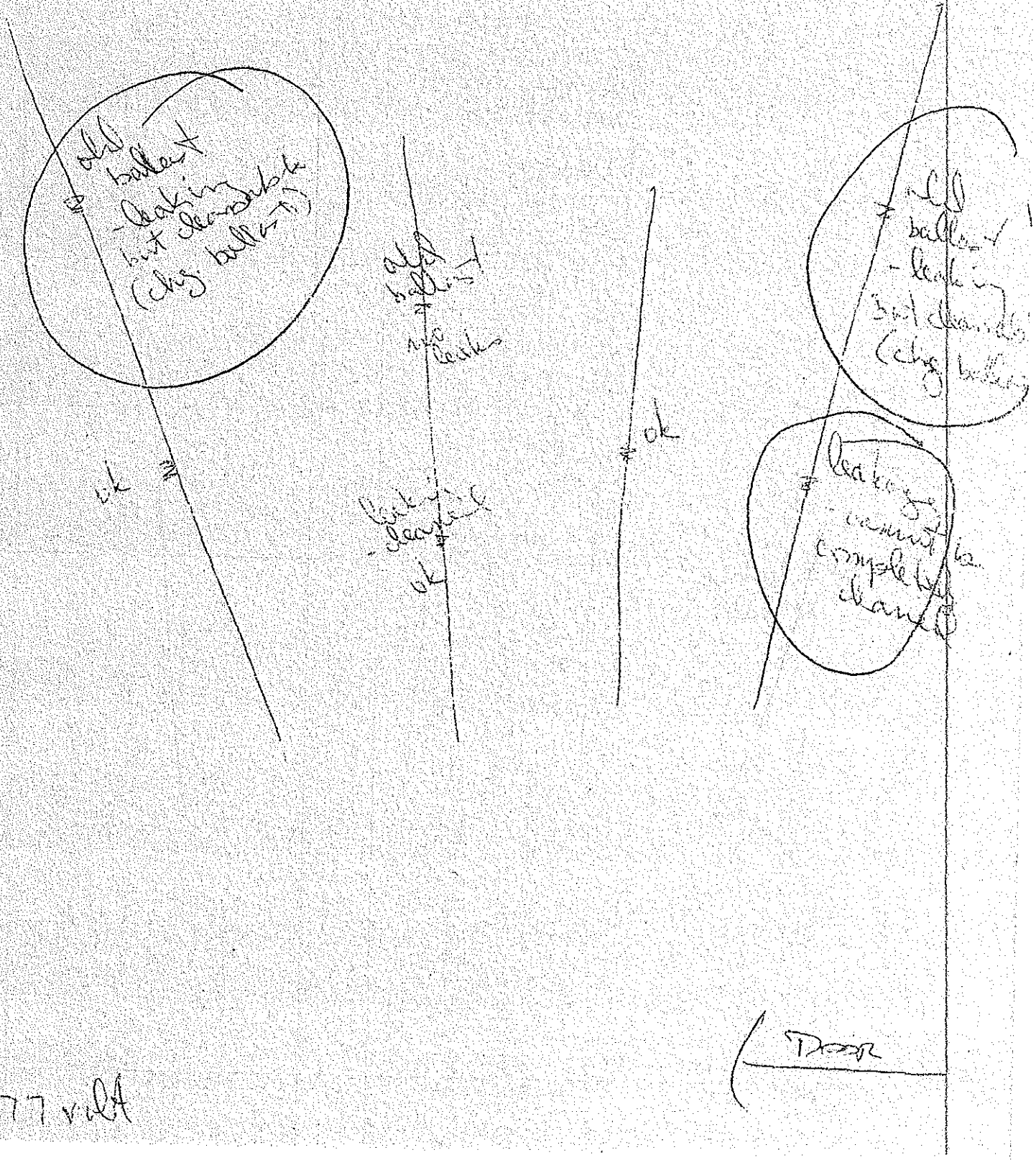


Land Size

Land Type	Rating, Soil ID - or - Actual Frontage	Acreage - or - Effective Frontage	Square Feet - or - Effective Depth	Influence Factor
74 Commercial V			186872.00	

EXHIBIT T

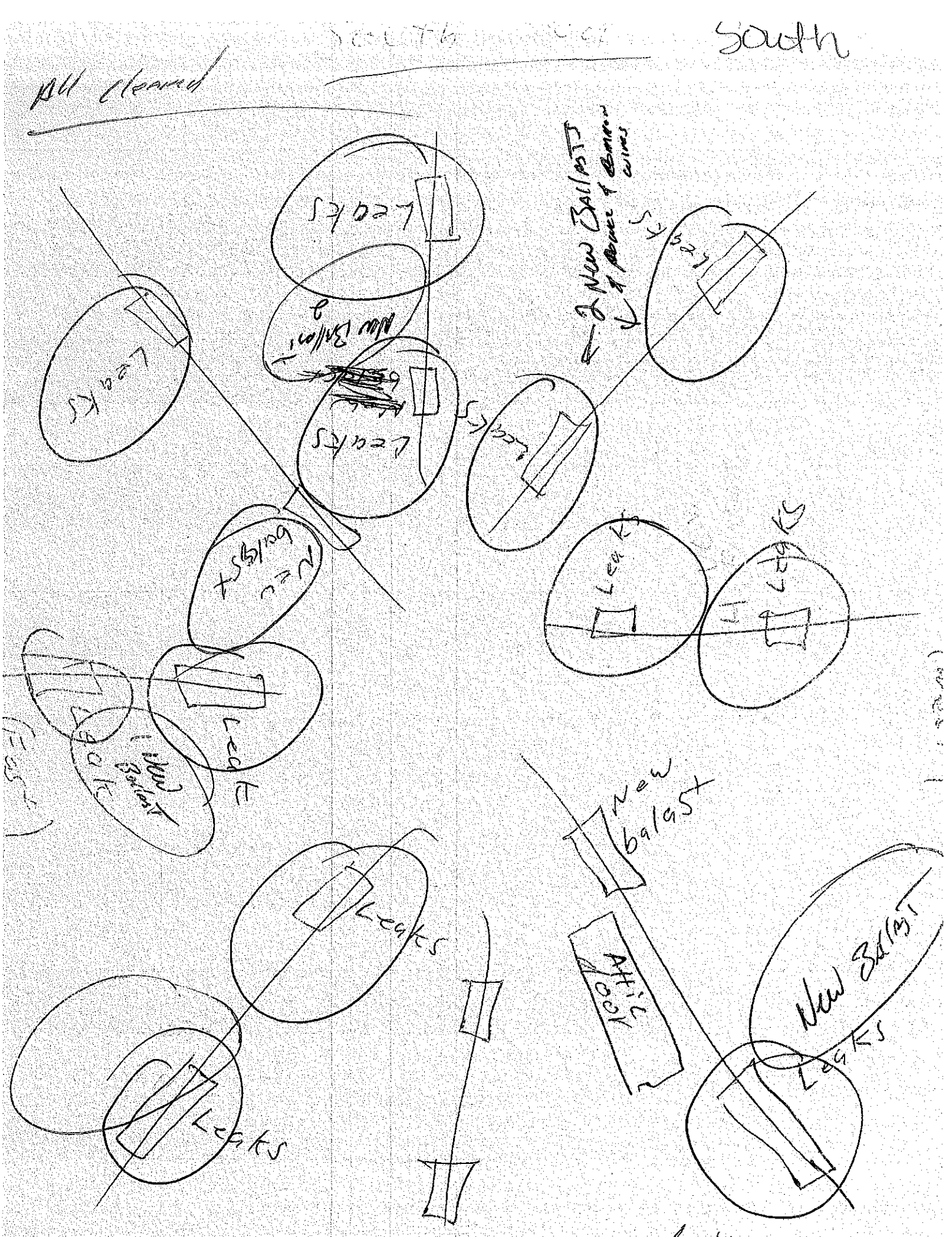
Room 5



277 vlA

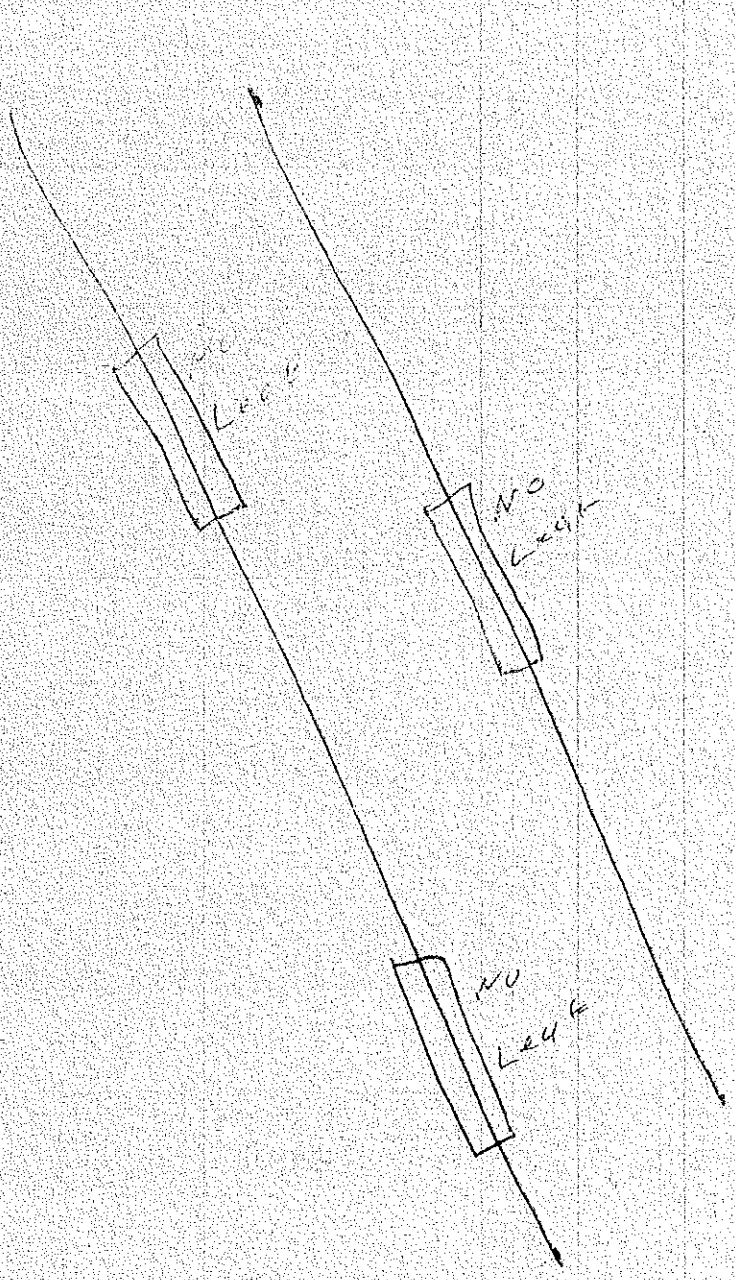
All cleared

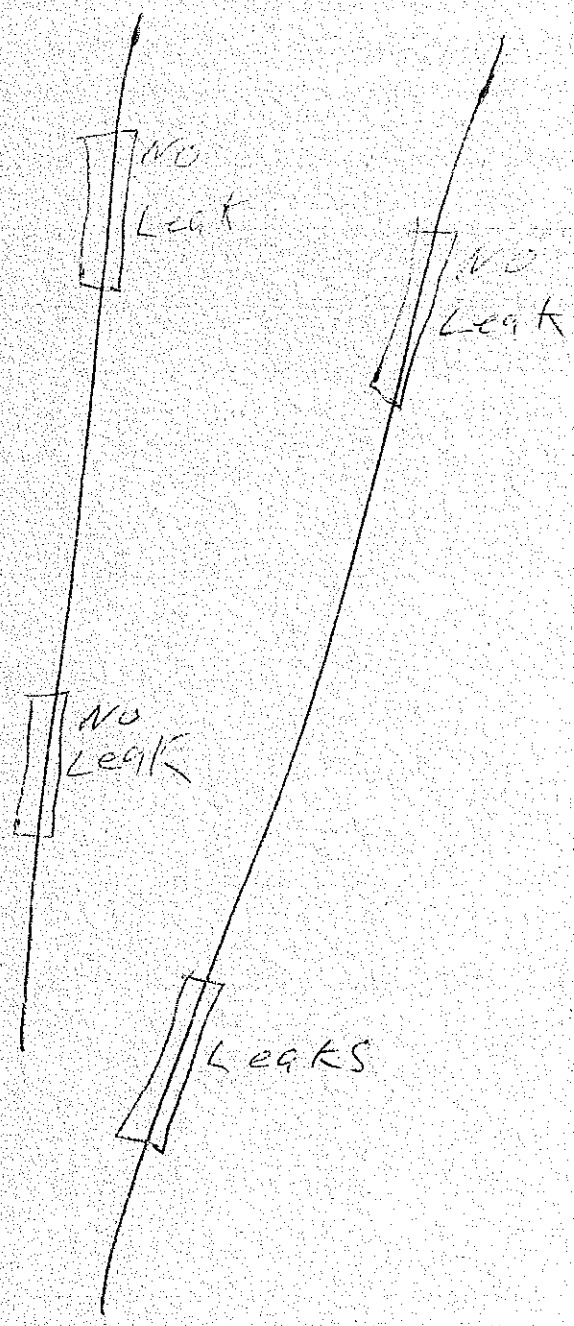
South



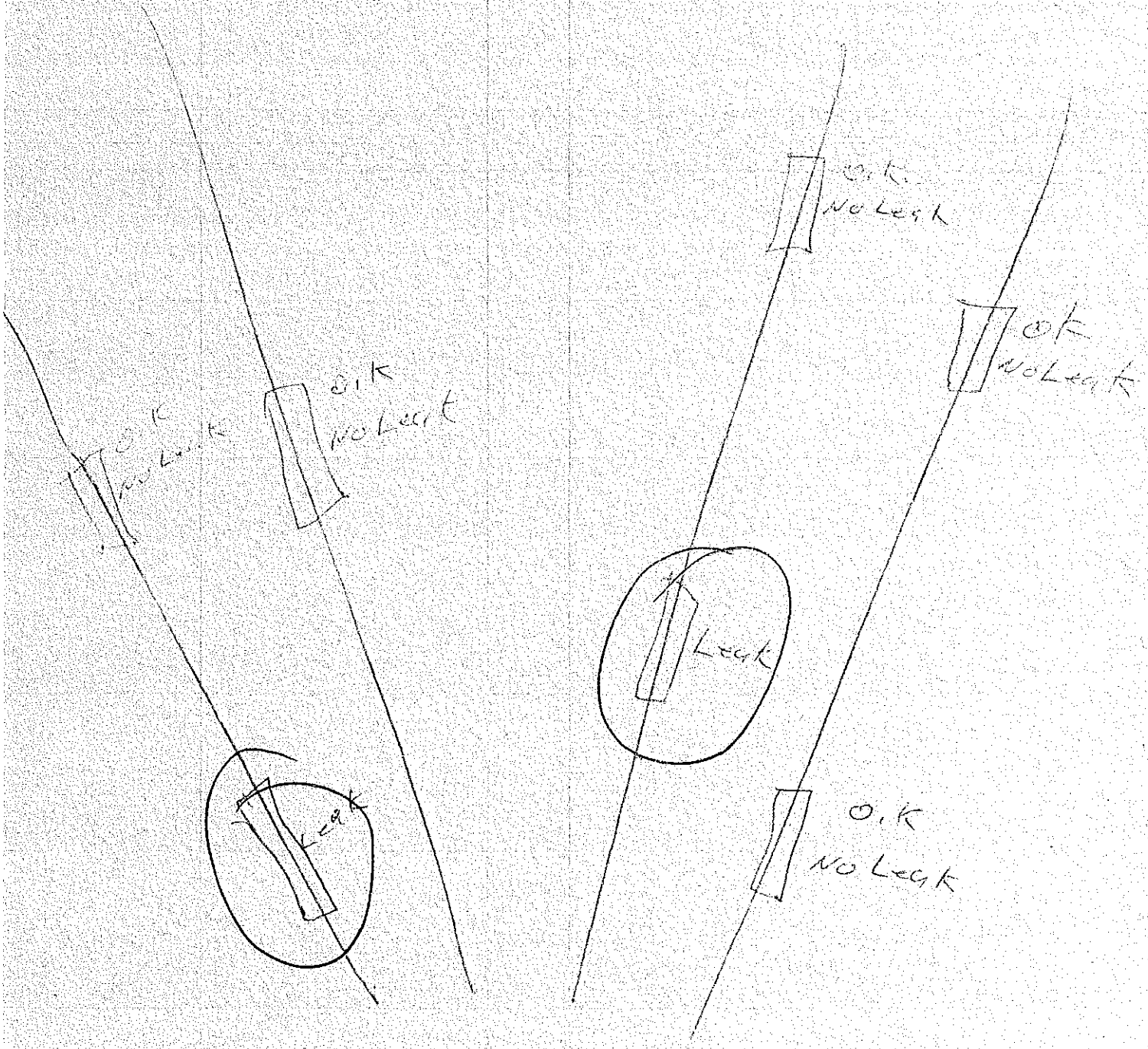
door

Room 7

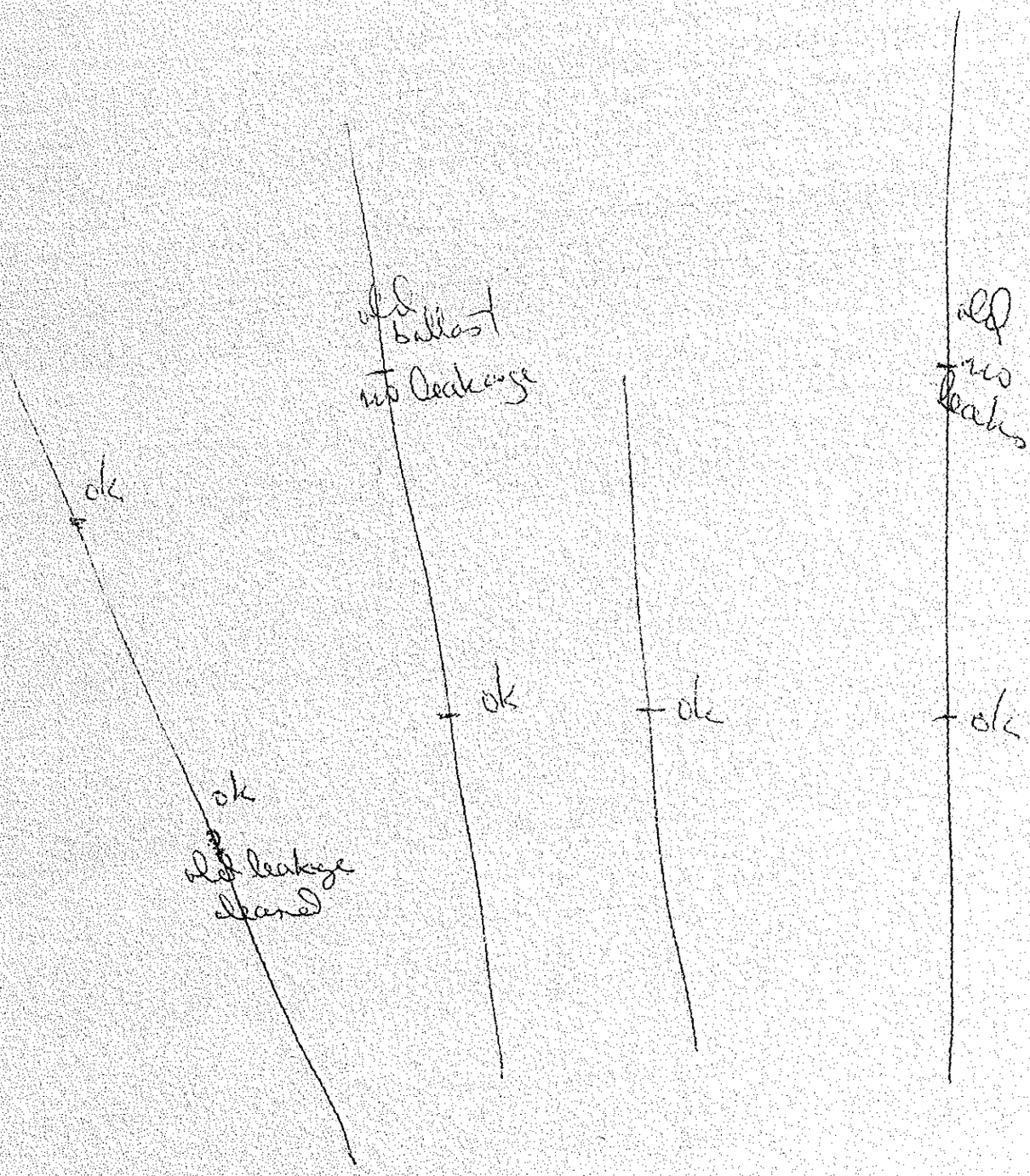




Room 4

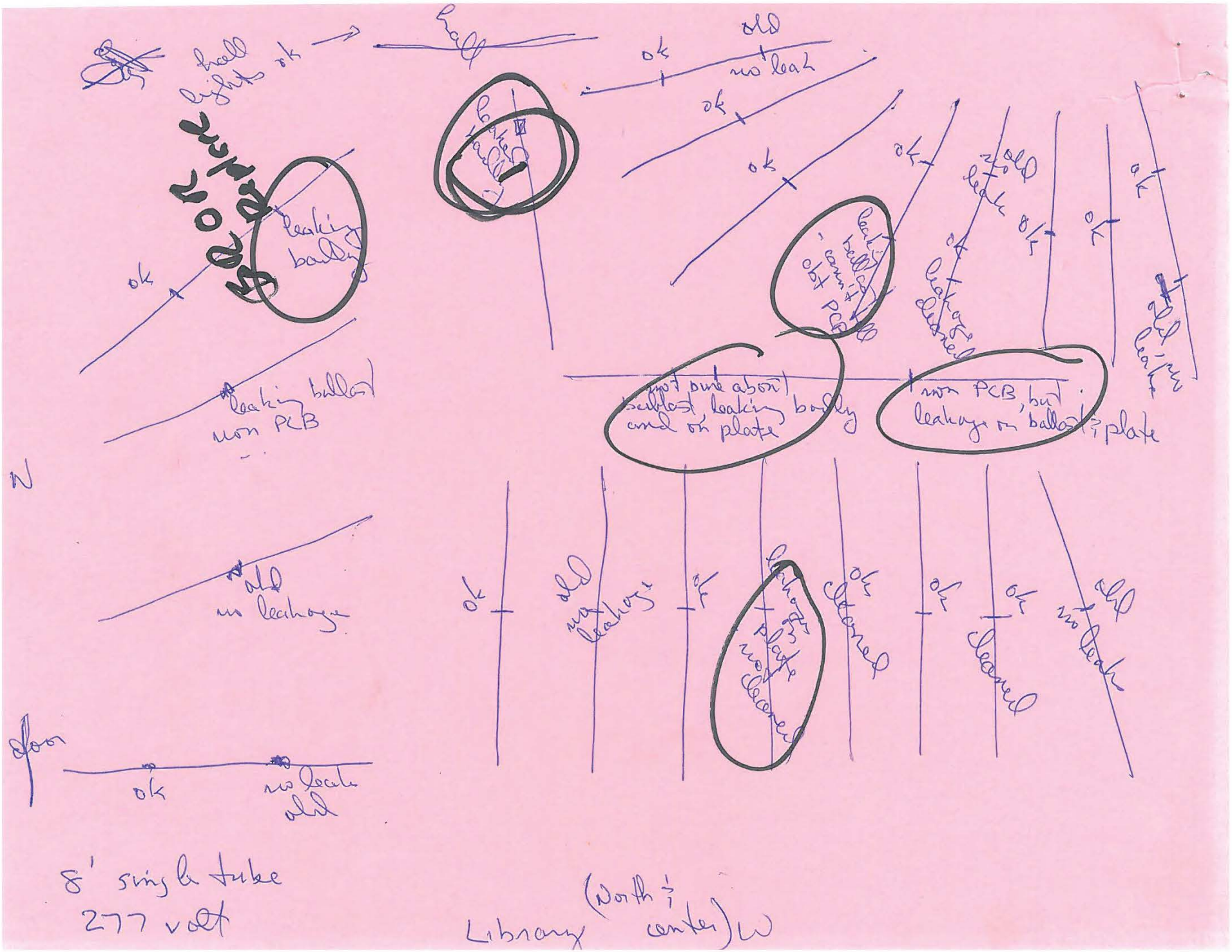


Room 3



277 volt

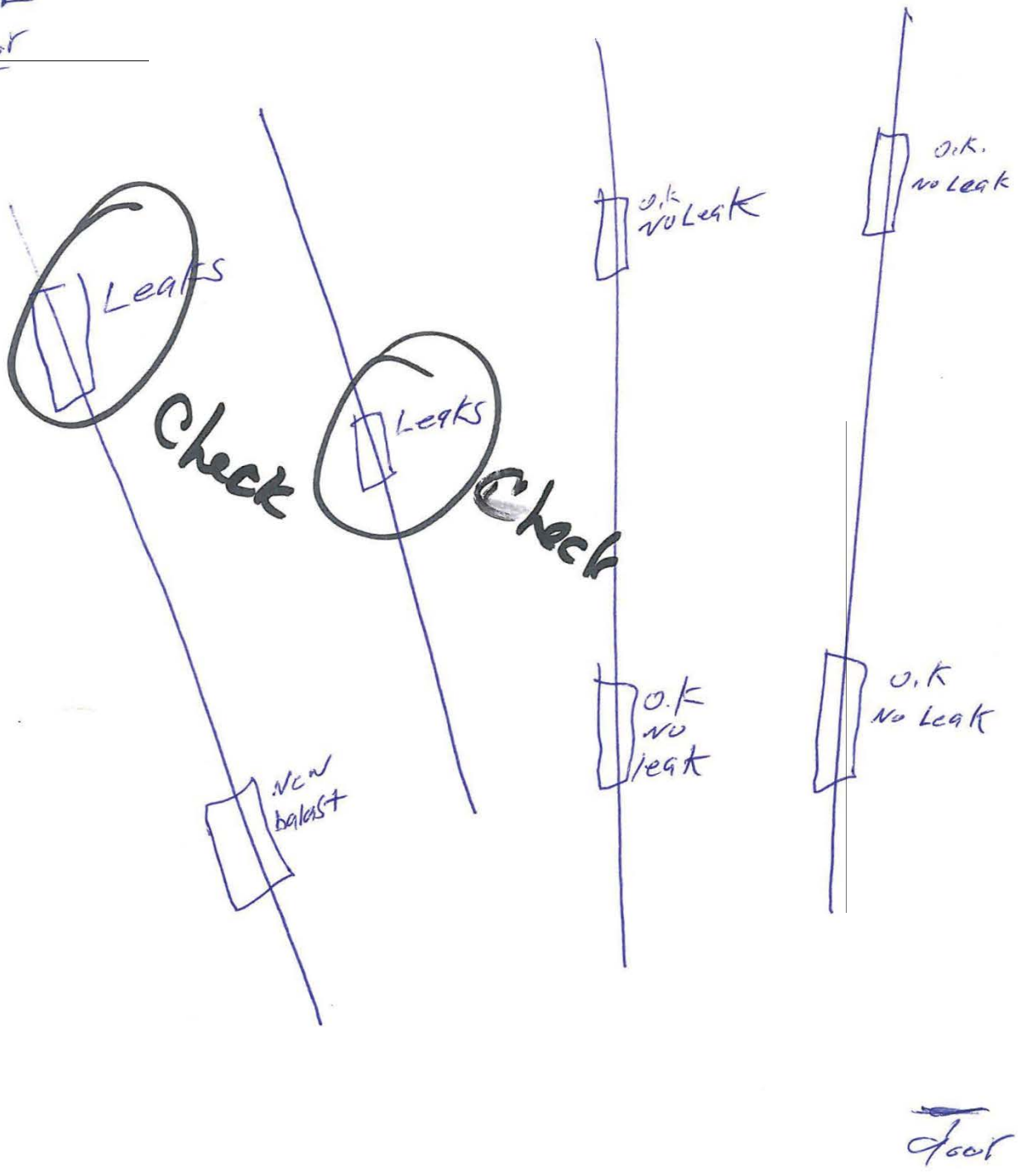
Dom

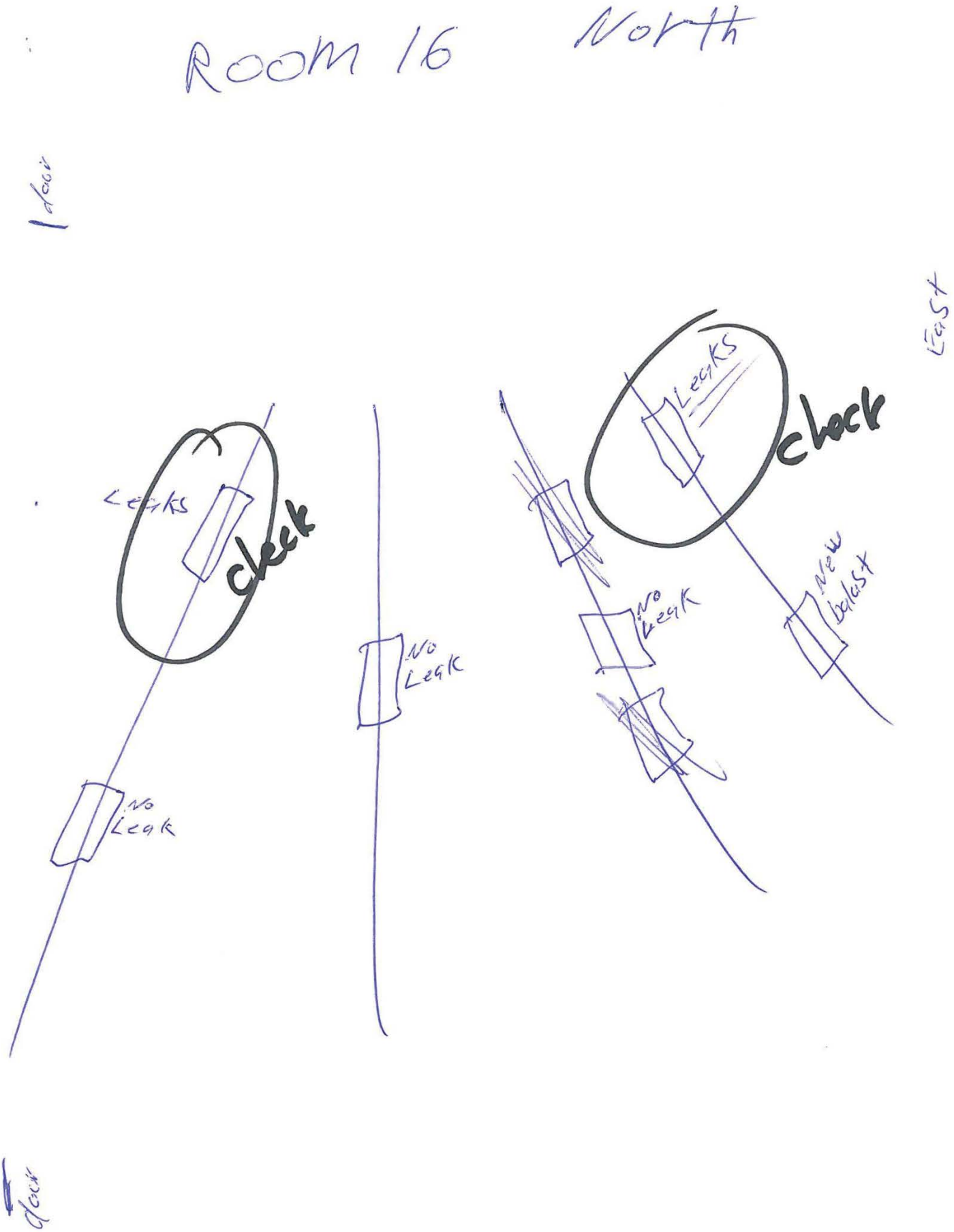

hall lights ok
ok
leaking ballast
non PCB
ok
old
no leak
ok
ok
ok
old
no leak
ok
leaking ballast
not PCB
ok
old
no leak
ok
ok
ok
leaking ballast
not sure about ballast leaking ballast and on plate
non PCB, but leakage on ballast & plate
N
old
no leakage
ok
old
no leakage
ok
leakage on plate not cleaned
ok
cleaned
ok
ok
cleaned
old
no leak
floor
ok
no leak old
8' single tube
277 volt
Library (North center) W

Door
S
old leaking
ok
old leaking
ok
ok
old leaking
Library (Southwood)
N
ok
Door

Room 14

East door

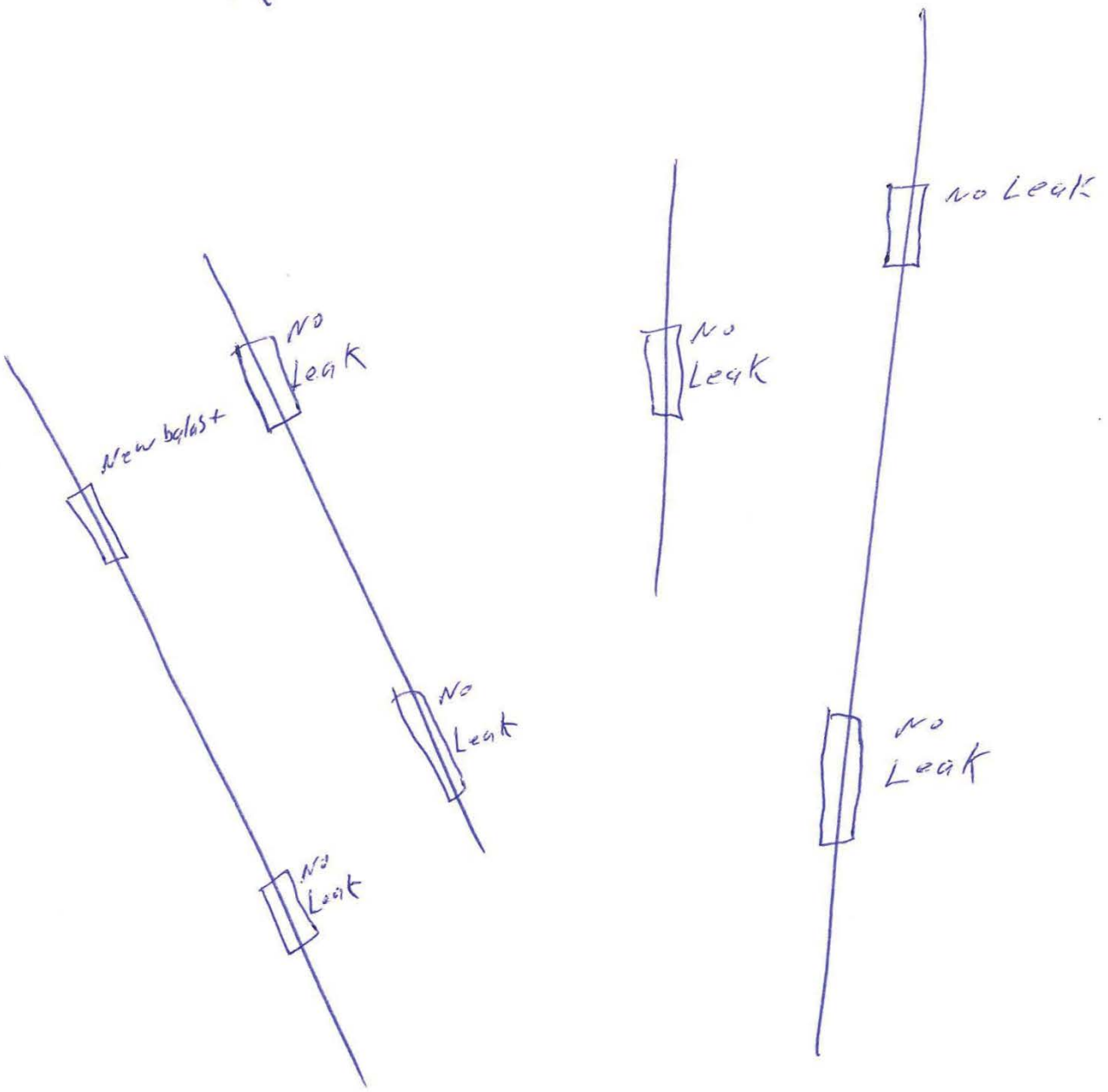


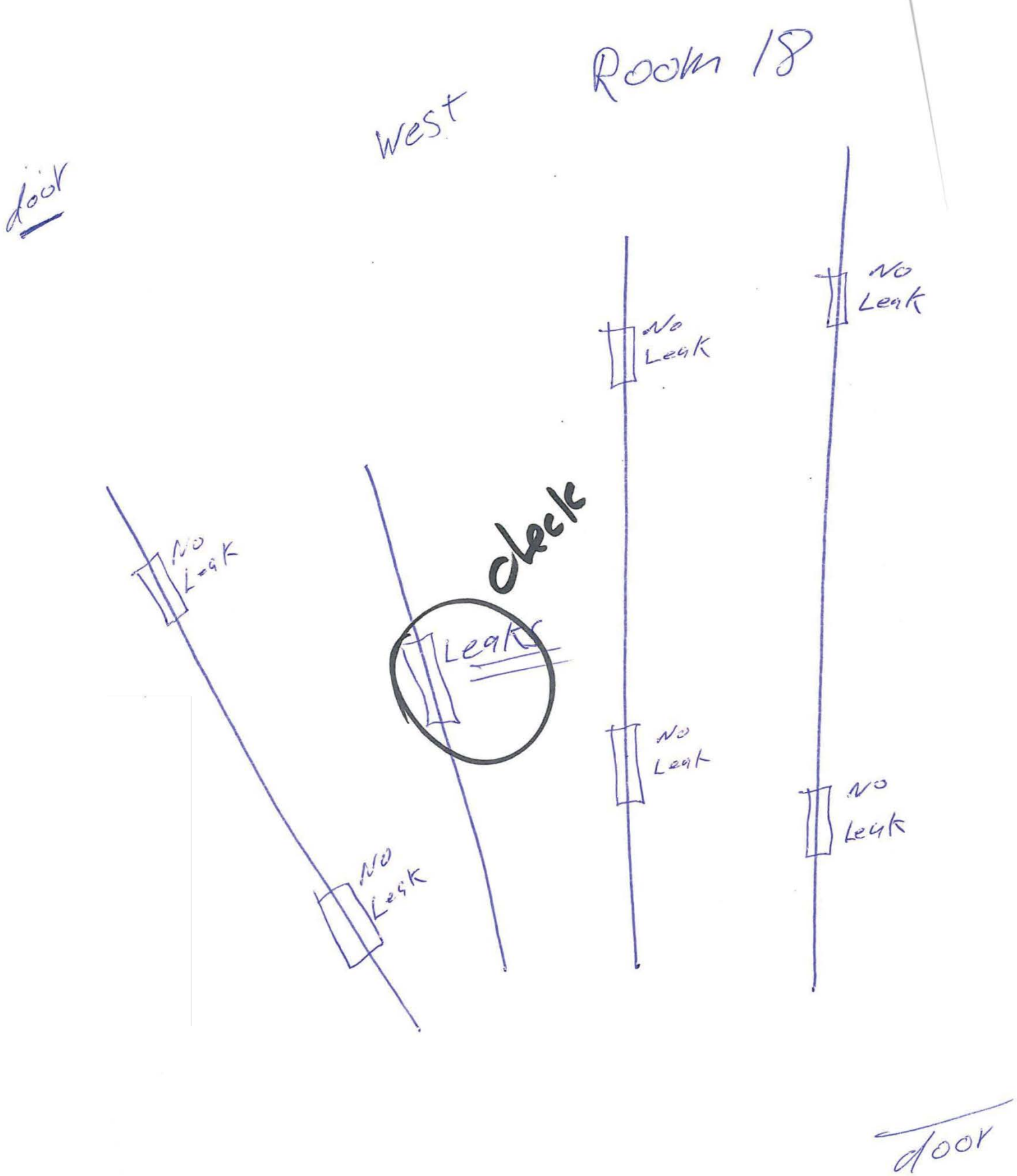

ROOM 16
North
Leaks
check
No Leak
No Leak
Leaks
check
No Leak
New ballast
East

North

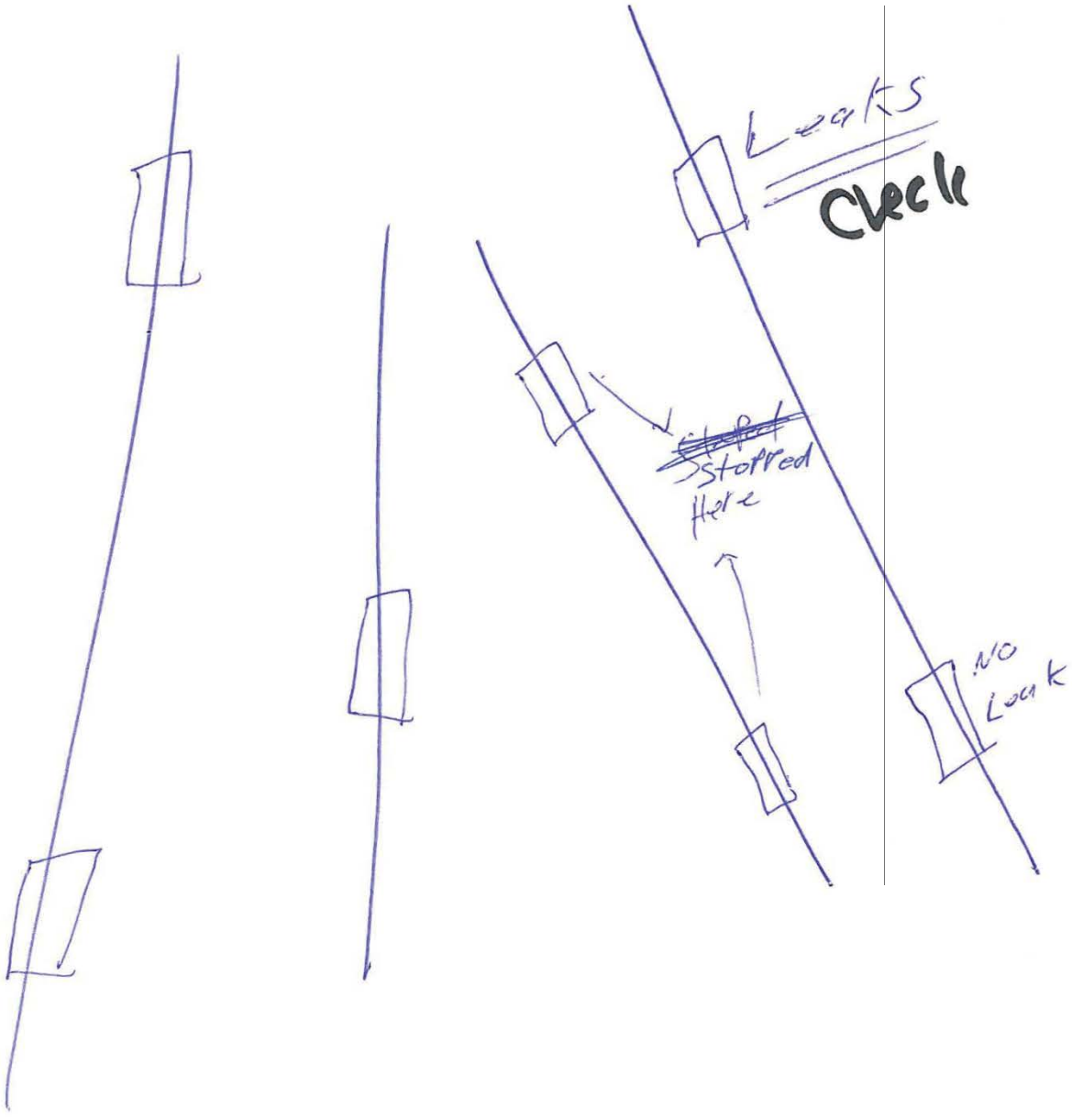
~~Room 17~~

Room 17



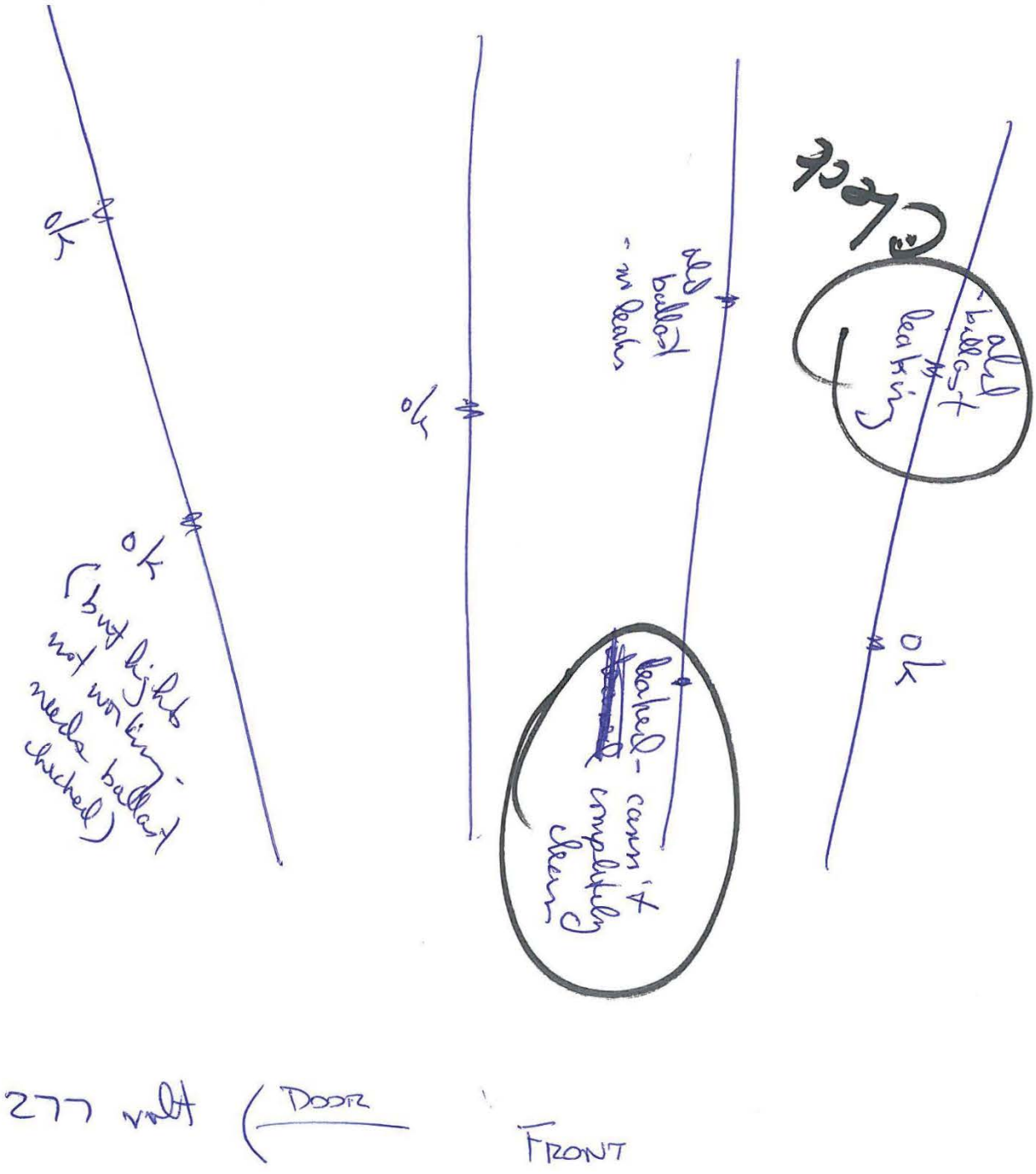

Room 18
west
door
No Leak
No Leak
No Leak
No Leak
No Leak
No Leak
Leak
clock
door

Room 17
West
door
No Leak
Leaks
Check
No Leak
Leaks
Check
No Leak
No Leak
door


Locks
Check
Stopped
Here
NO
Lock

East

Room 6



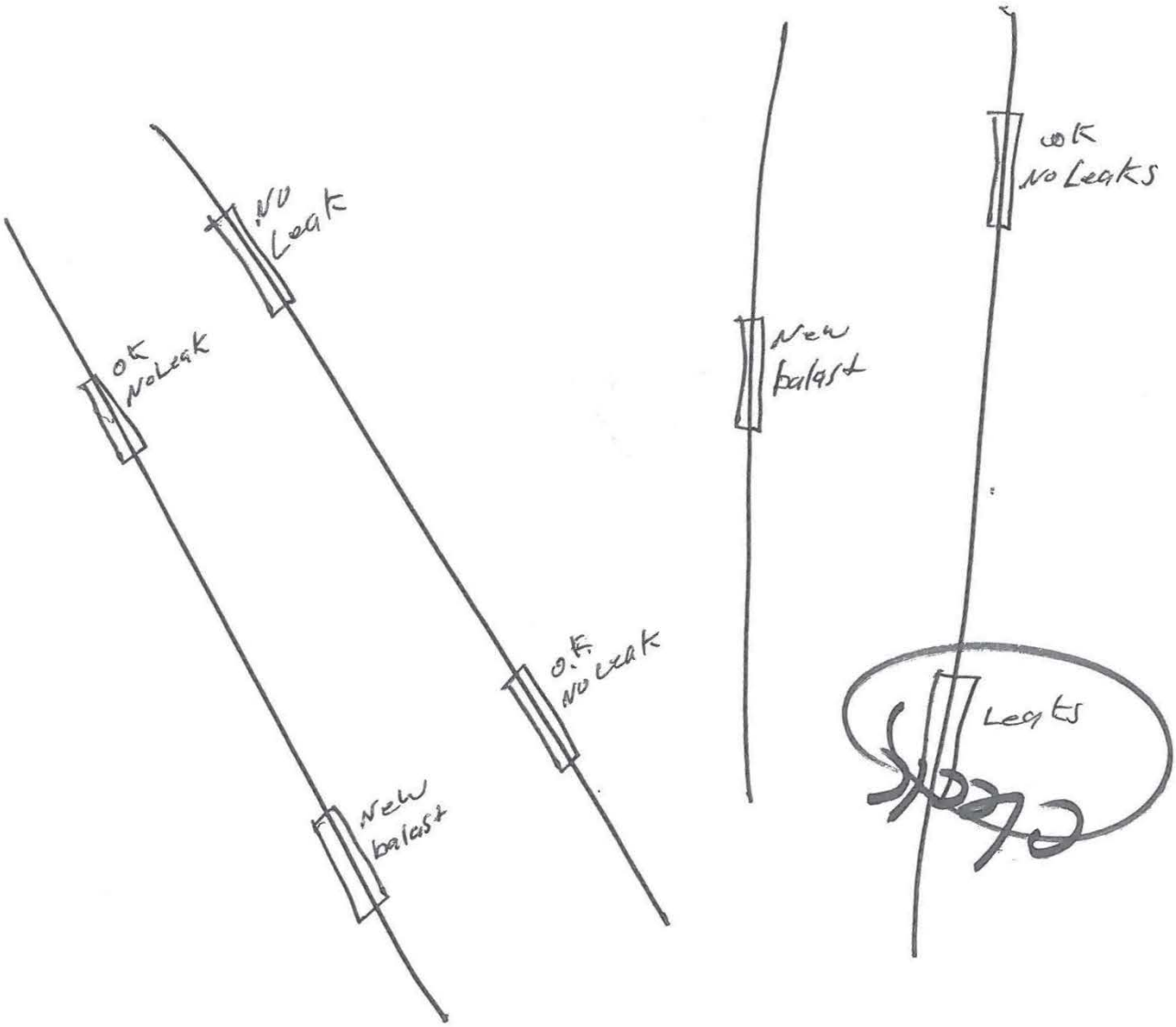
277 volt (DOOR

FRONT

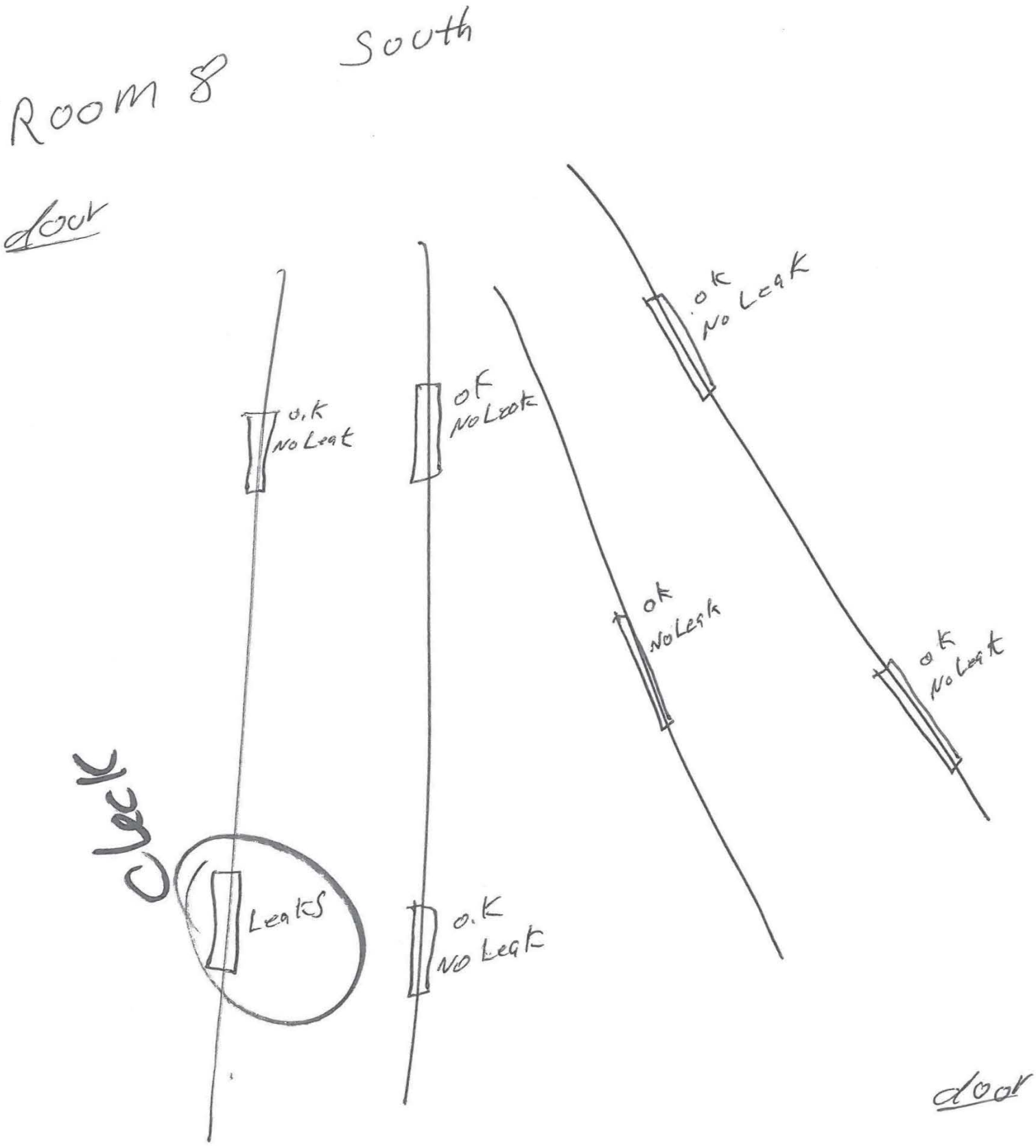
door

East

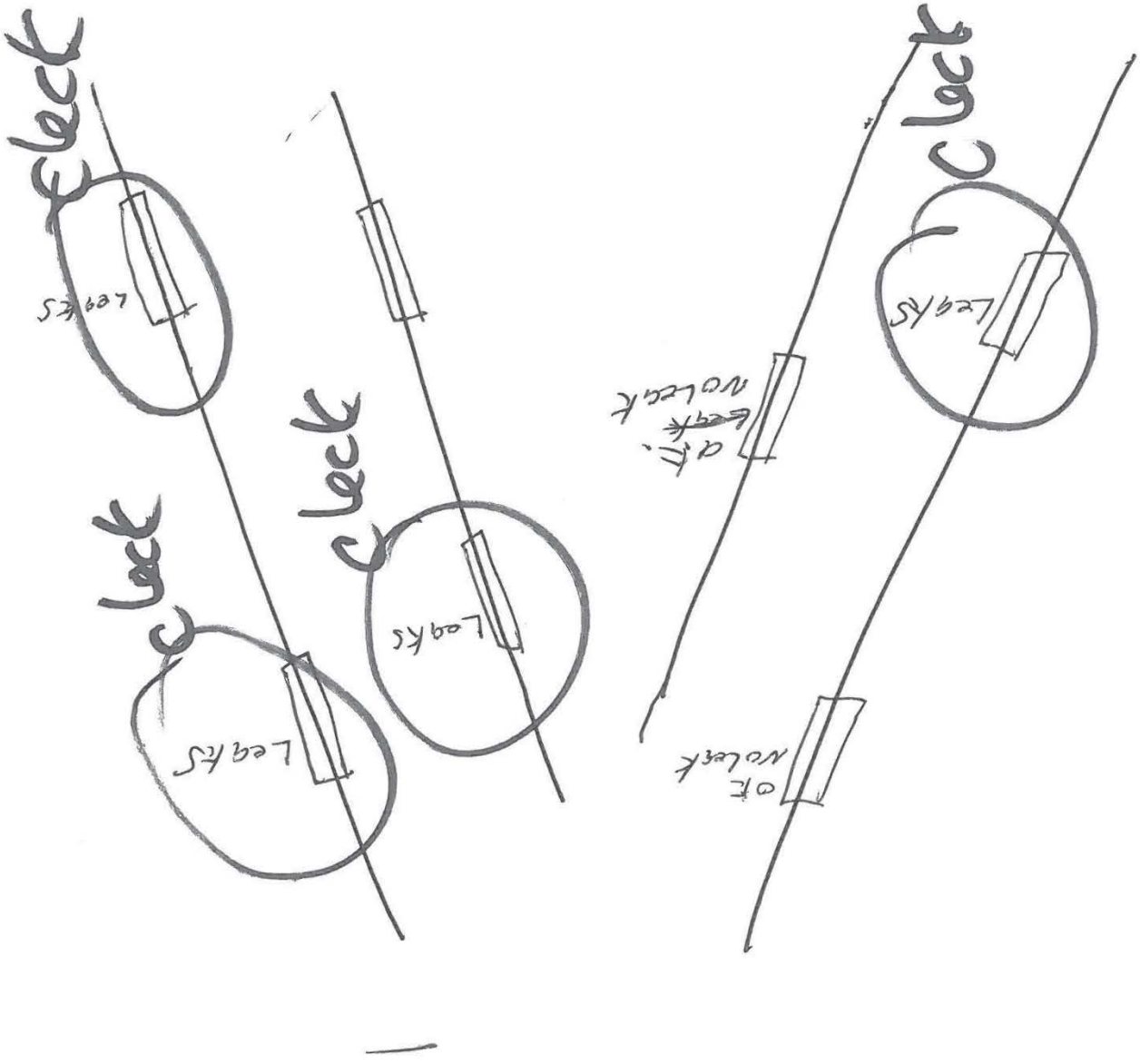
Room 7

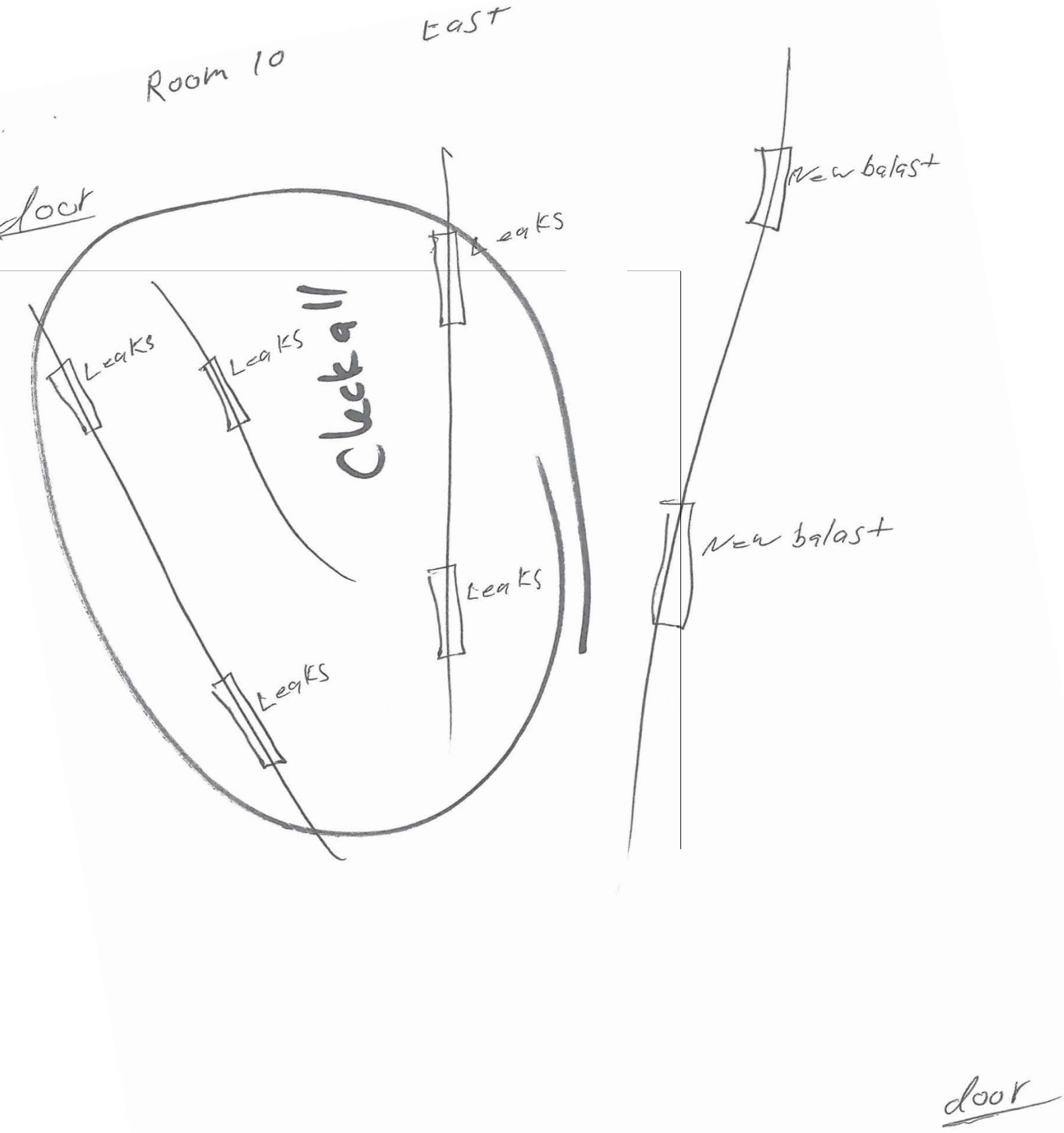


door


Room 8
South
door
o.k
No Leak
o.k
No Leak
o.k
No Leak
o.k
No Leak
o.k
No Leak
Leaks
Clock
door

Room 9 South

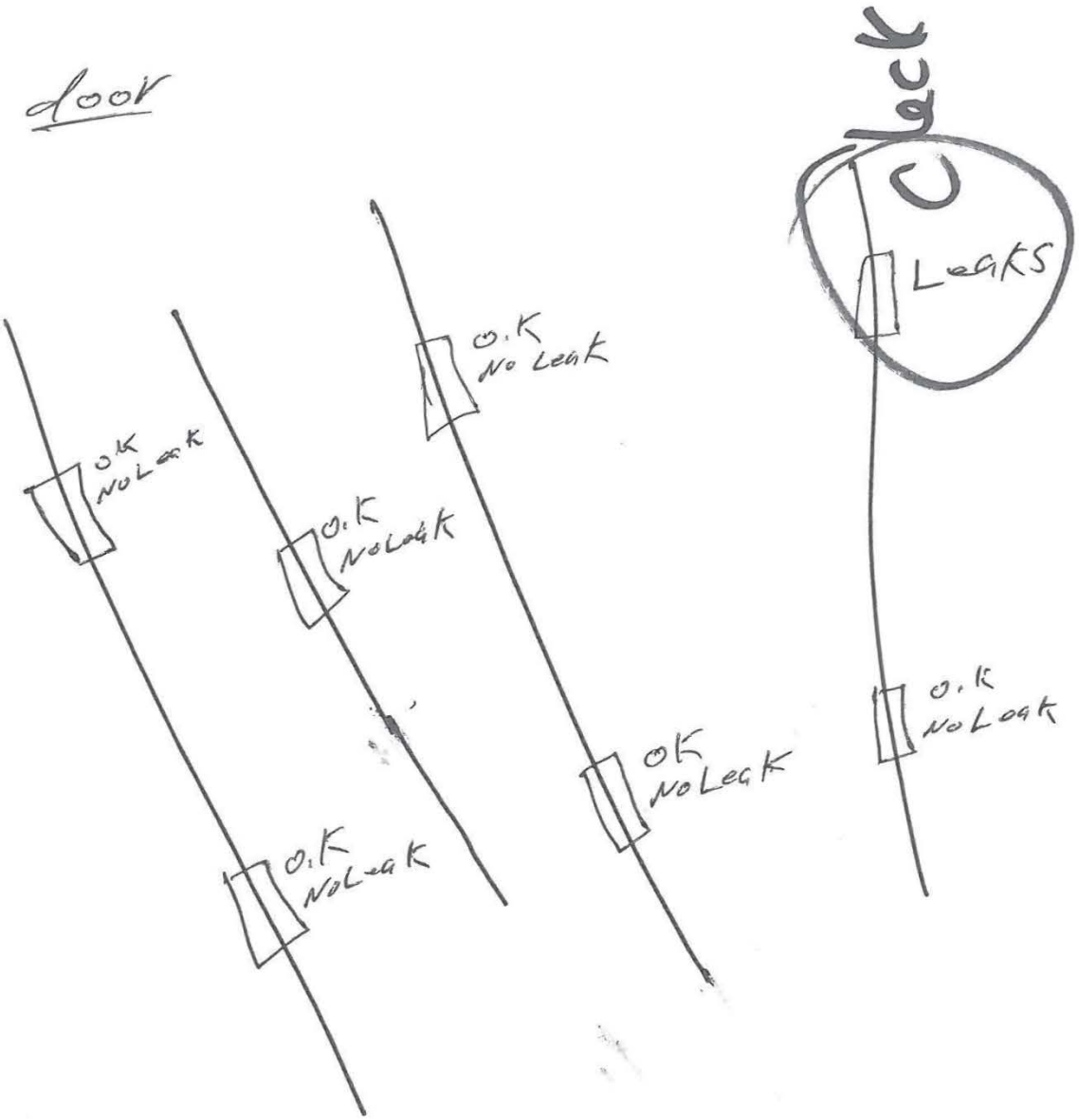

Clock
Legs
Clock
Legs
Clock
Legs
Clock
Legs
No Leg
Of
No Leg
Of


Room 10
East
door
Leaks
Leaks
Leaks
Leaks
Leaks
Check 11
New ballast
New ballast
door

Room 11 East door

Room 12

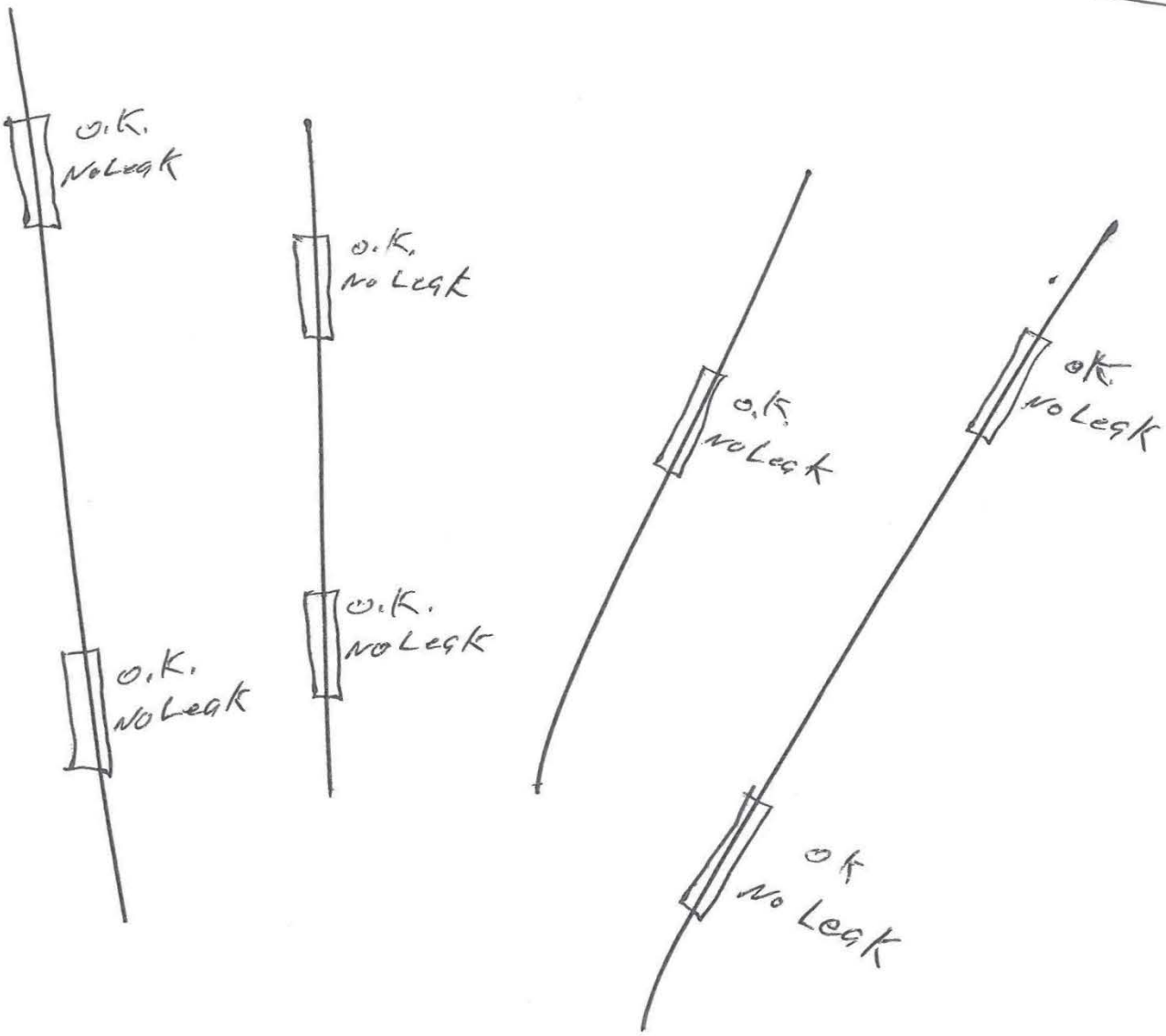
North



Room 13

North

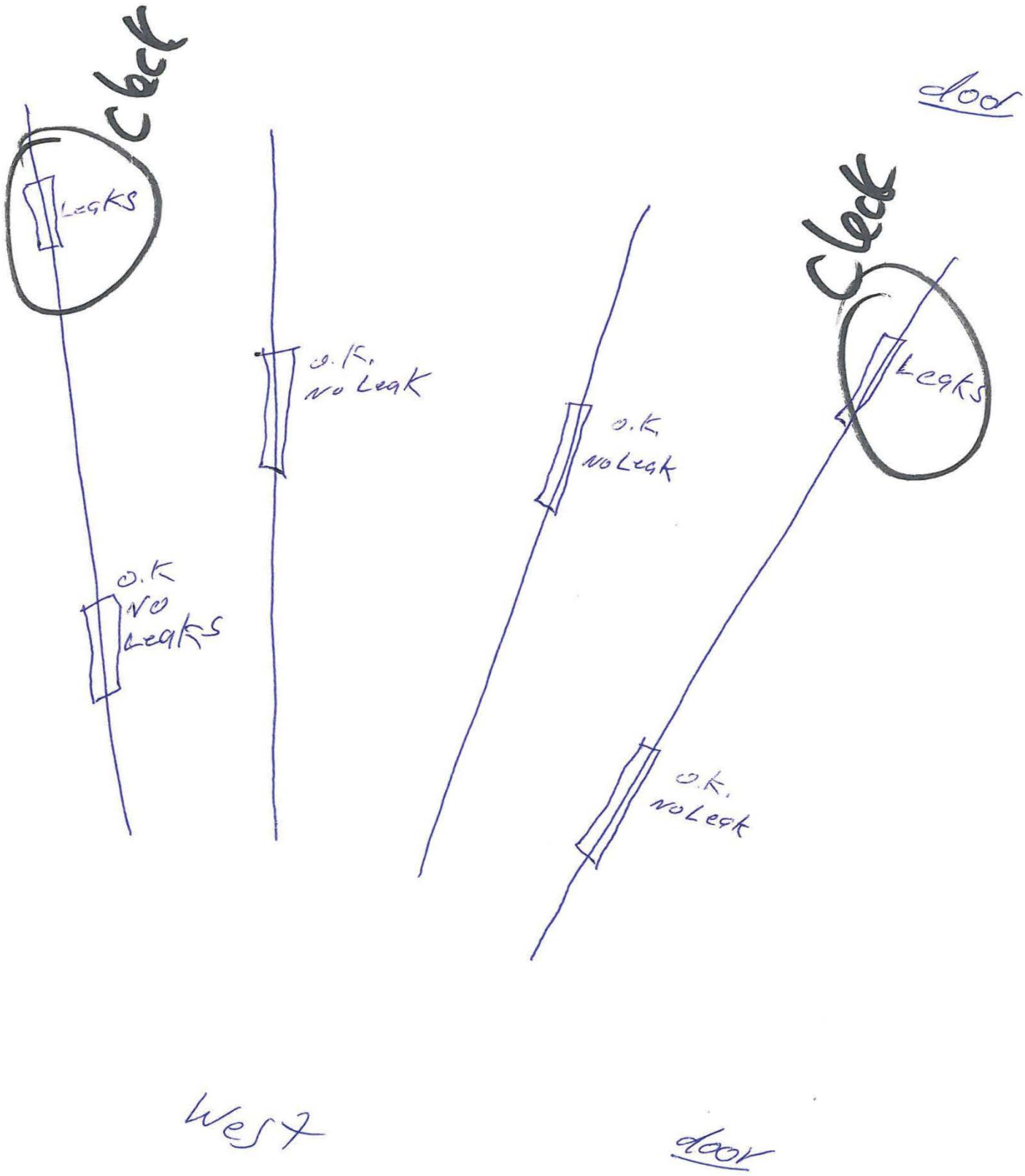
door



door

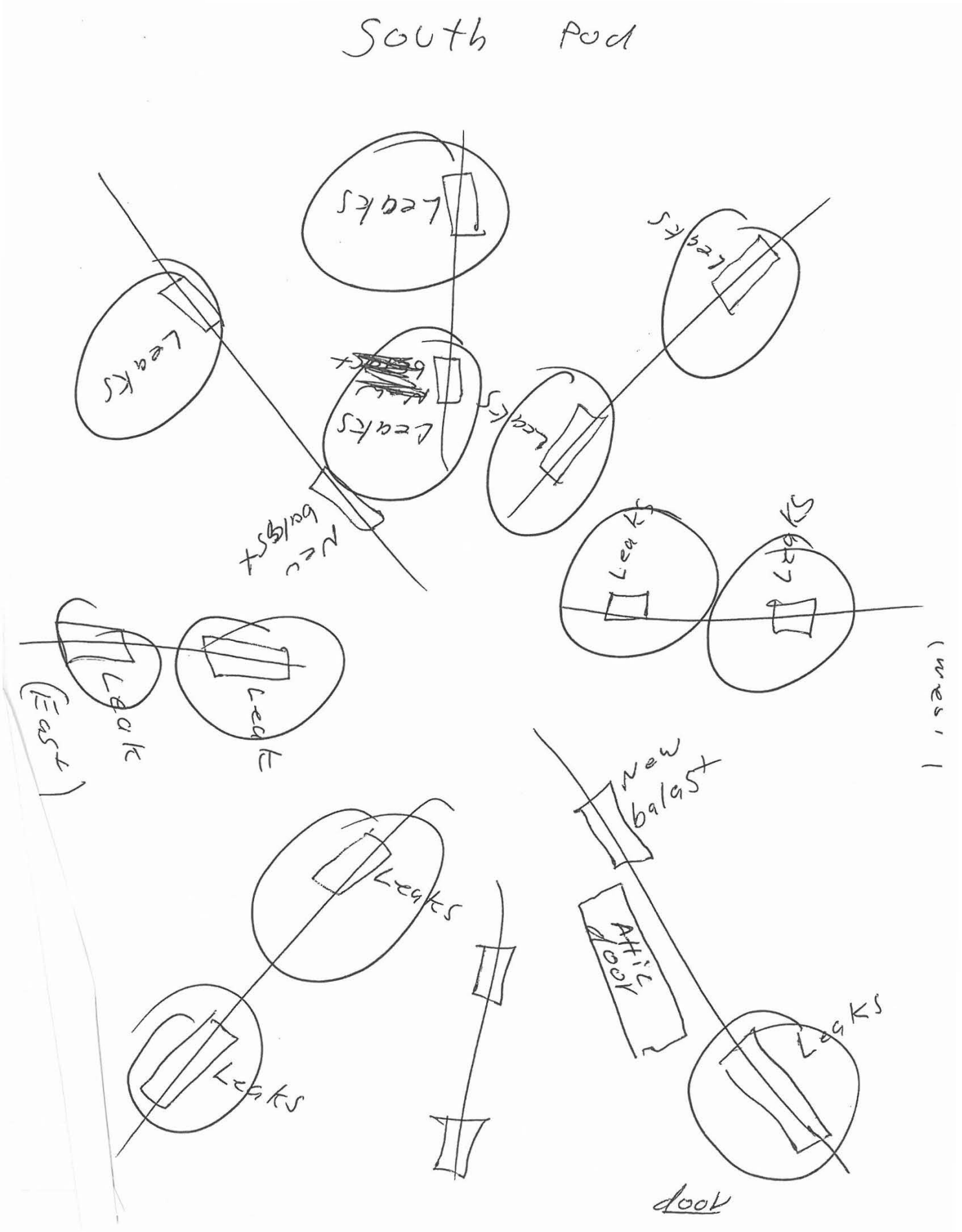
Room 15

East



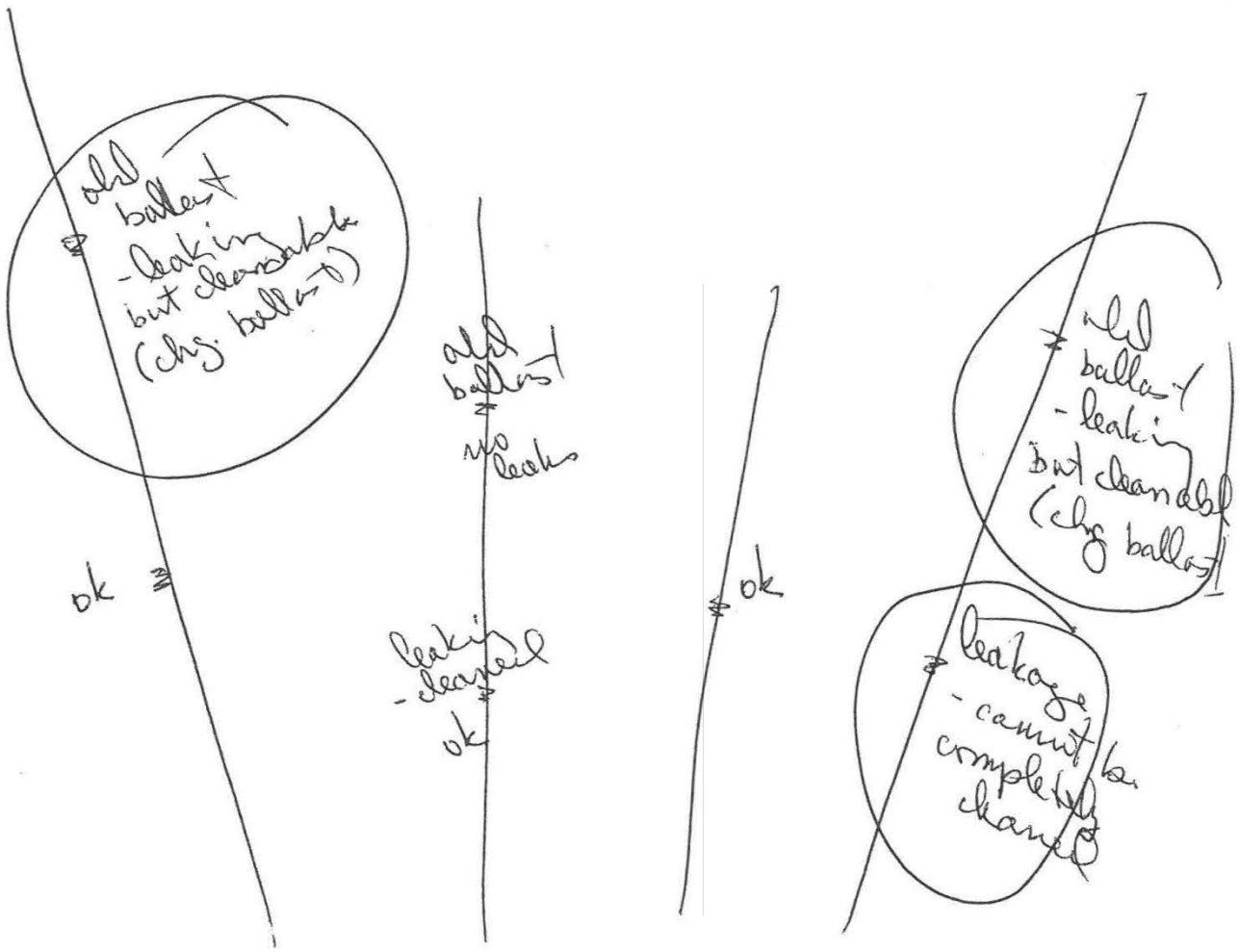
West

door


South Pod
Leaks
Leaks
Leaks
Leaks
Leaks
Leaks
New ballast
Leaks
Leaks
Leaks
Leaks
Leaks
Leaks
Leaks
Leaks
New ballast
Attic door
door
(East)
(West)

Room 5

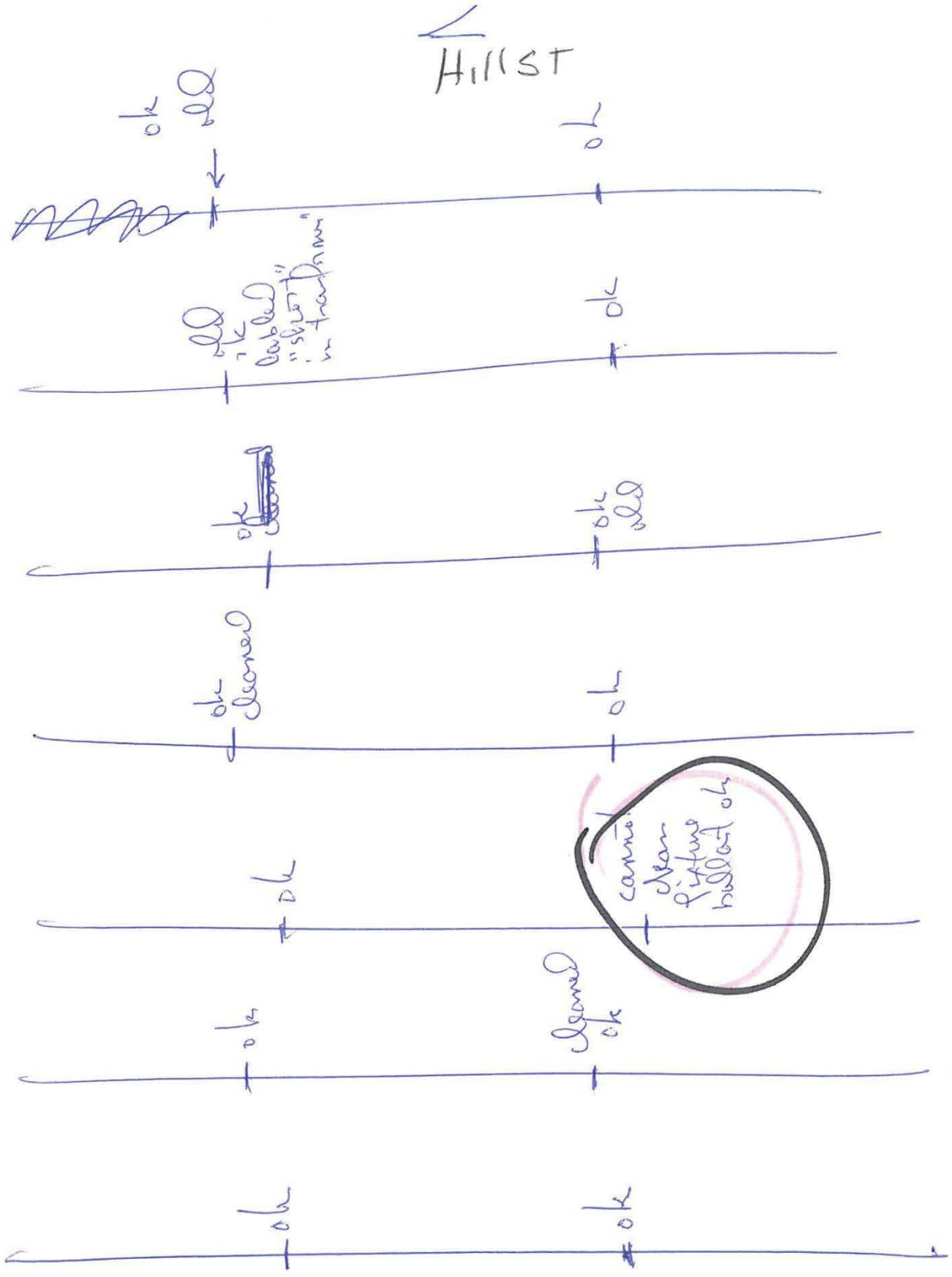
South



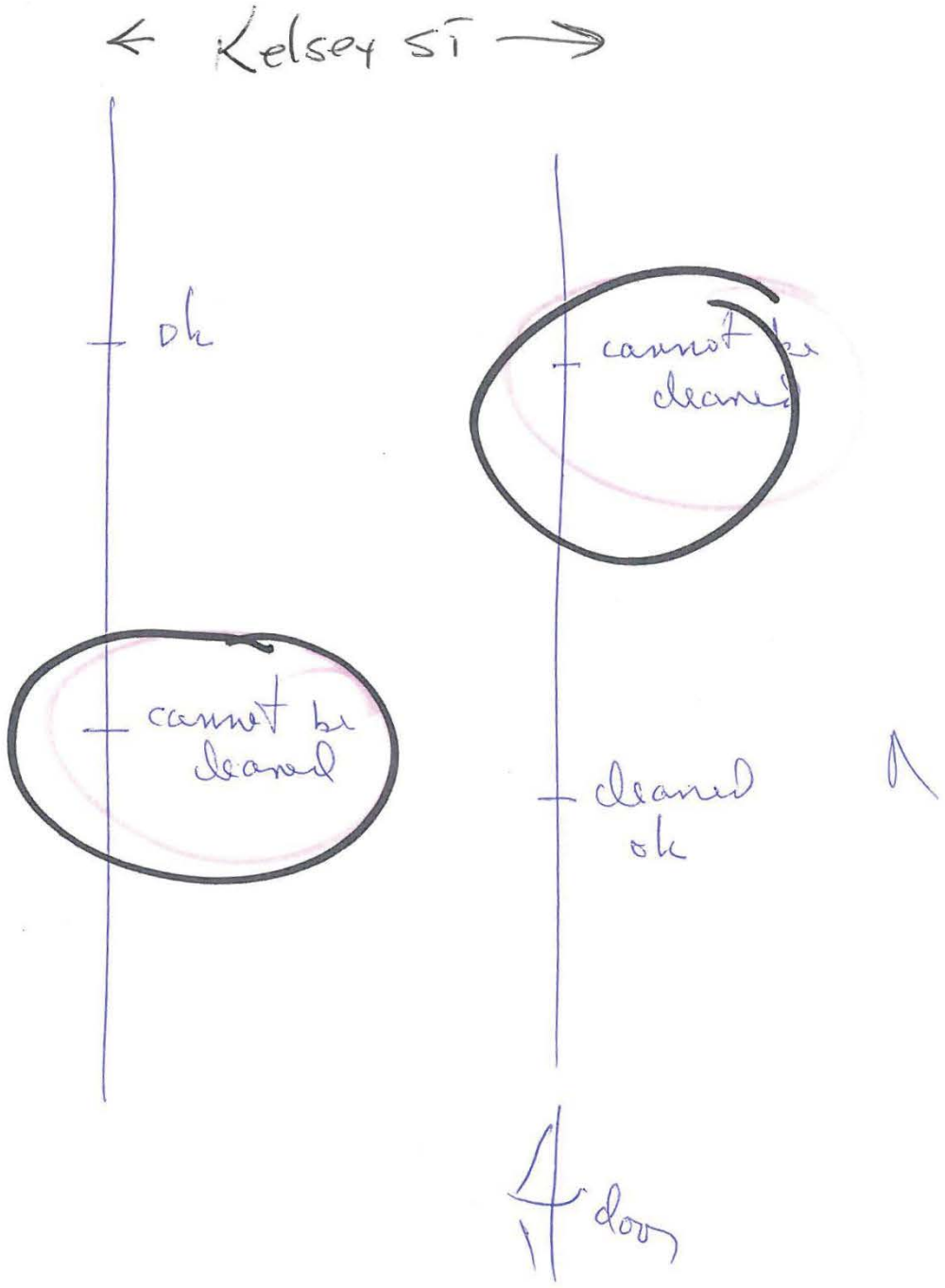
-77 rail

Door

MSDG_014455



277 volt
mix of 8' & 6' tubes



8' Music/Drama storage
tubes 277 volts

May need new Plate only

4 tube pistons converted to

S

N

E

W

Phase

MSDG_014458

E

6, 5, 8, 1, 9

Hanoi

single tubes

ok ok

ok ok

S

N

ok

cleaned old leakage / newer ballast

ok ok

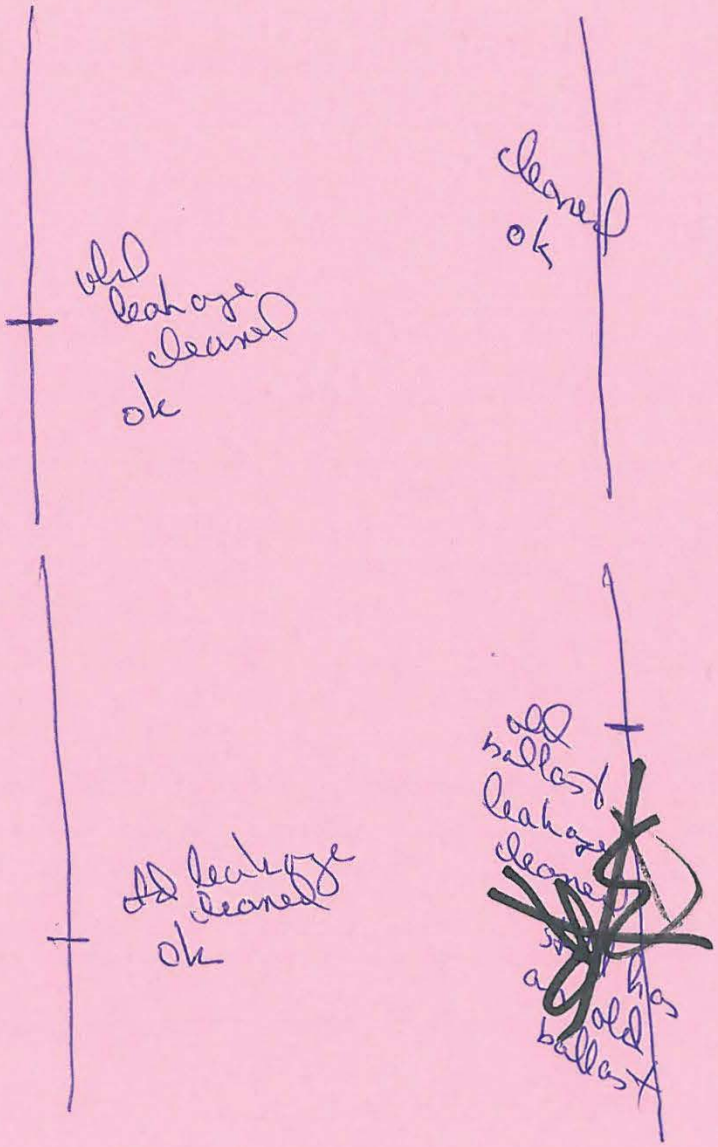
ok ok

Room A

W

N

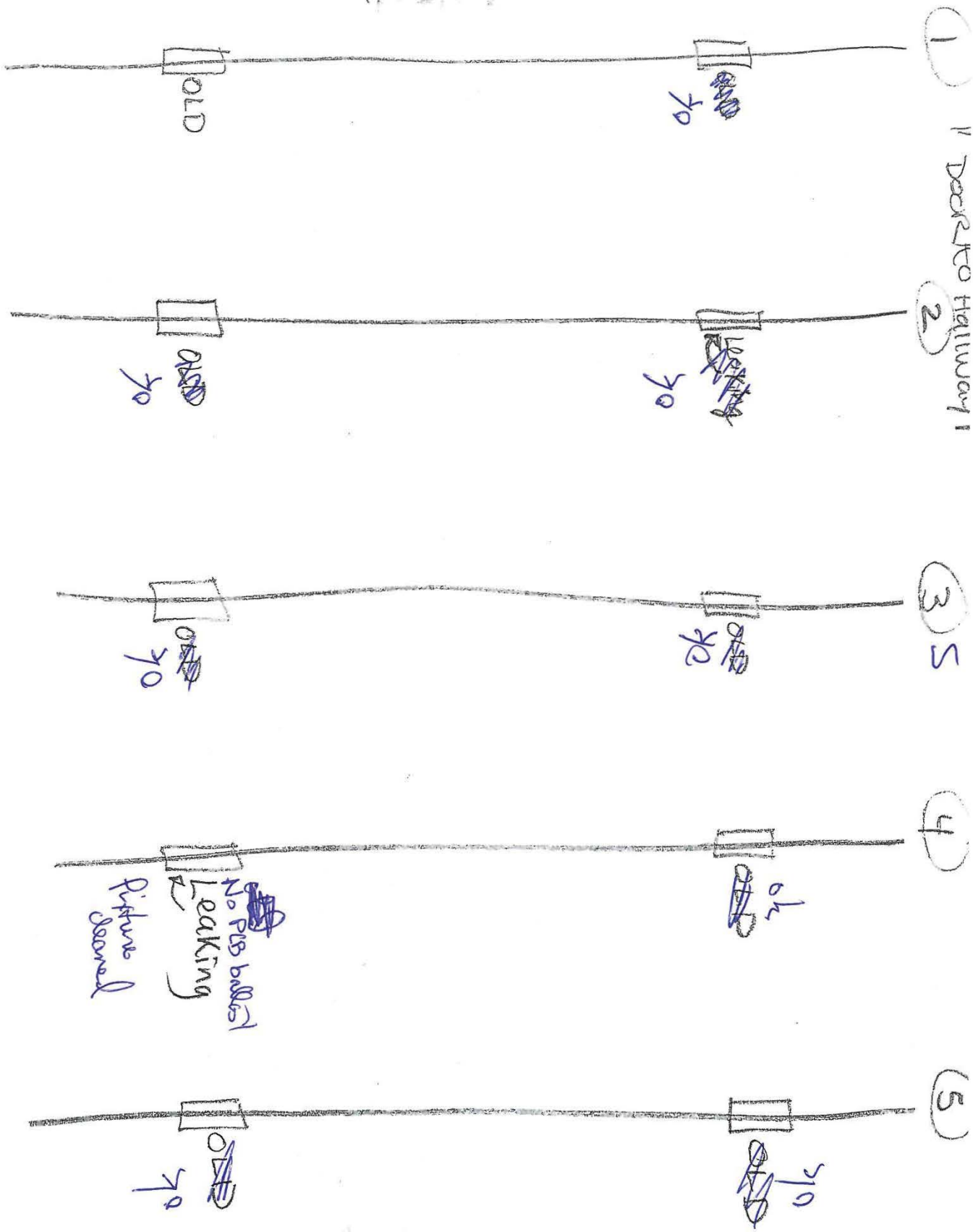
Prep area
between Rooms A & C



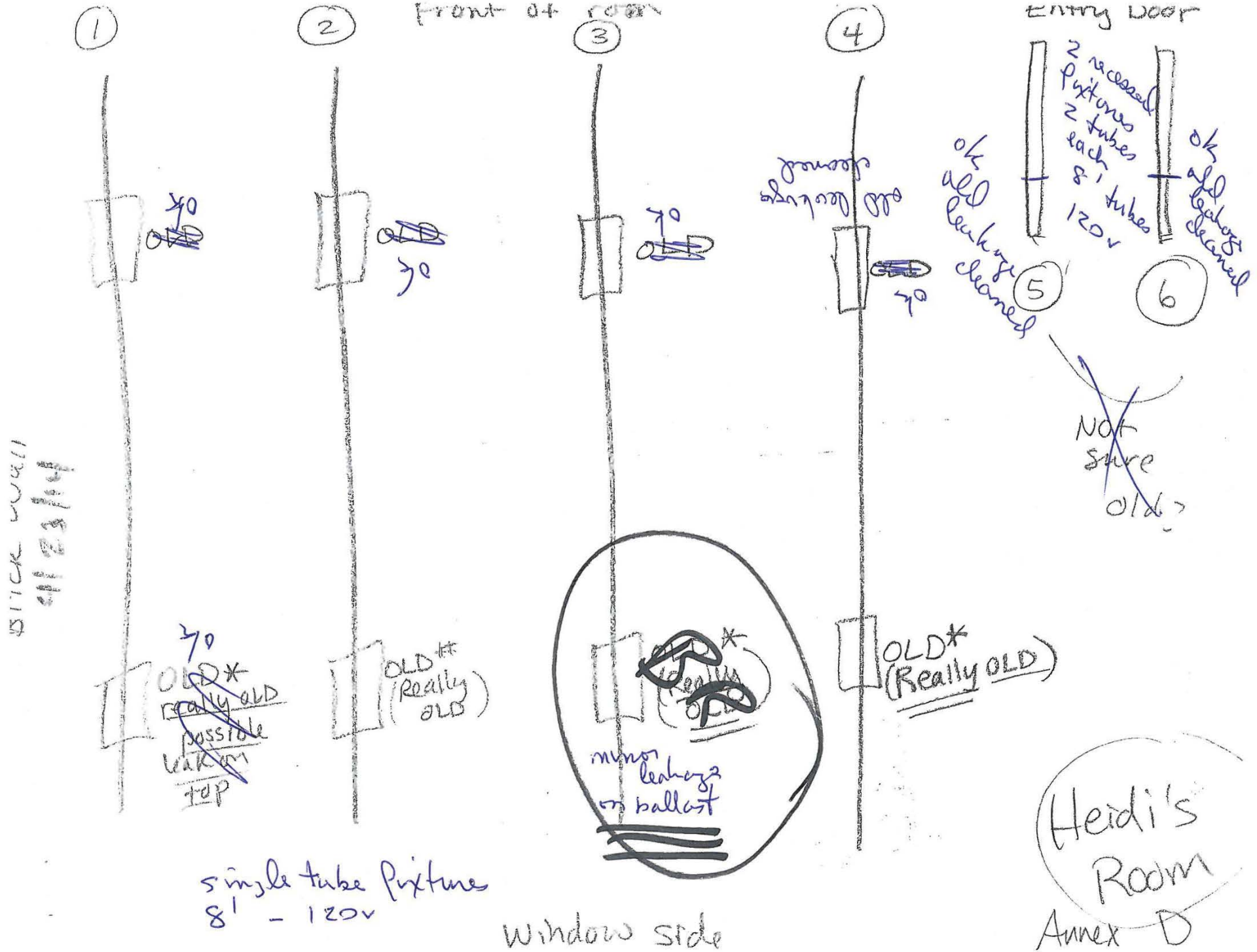
4 2 tube recessed fixtures
8' tubes 120 volt

S

Room C Cynthia's Room (Front) LL
4/23/14

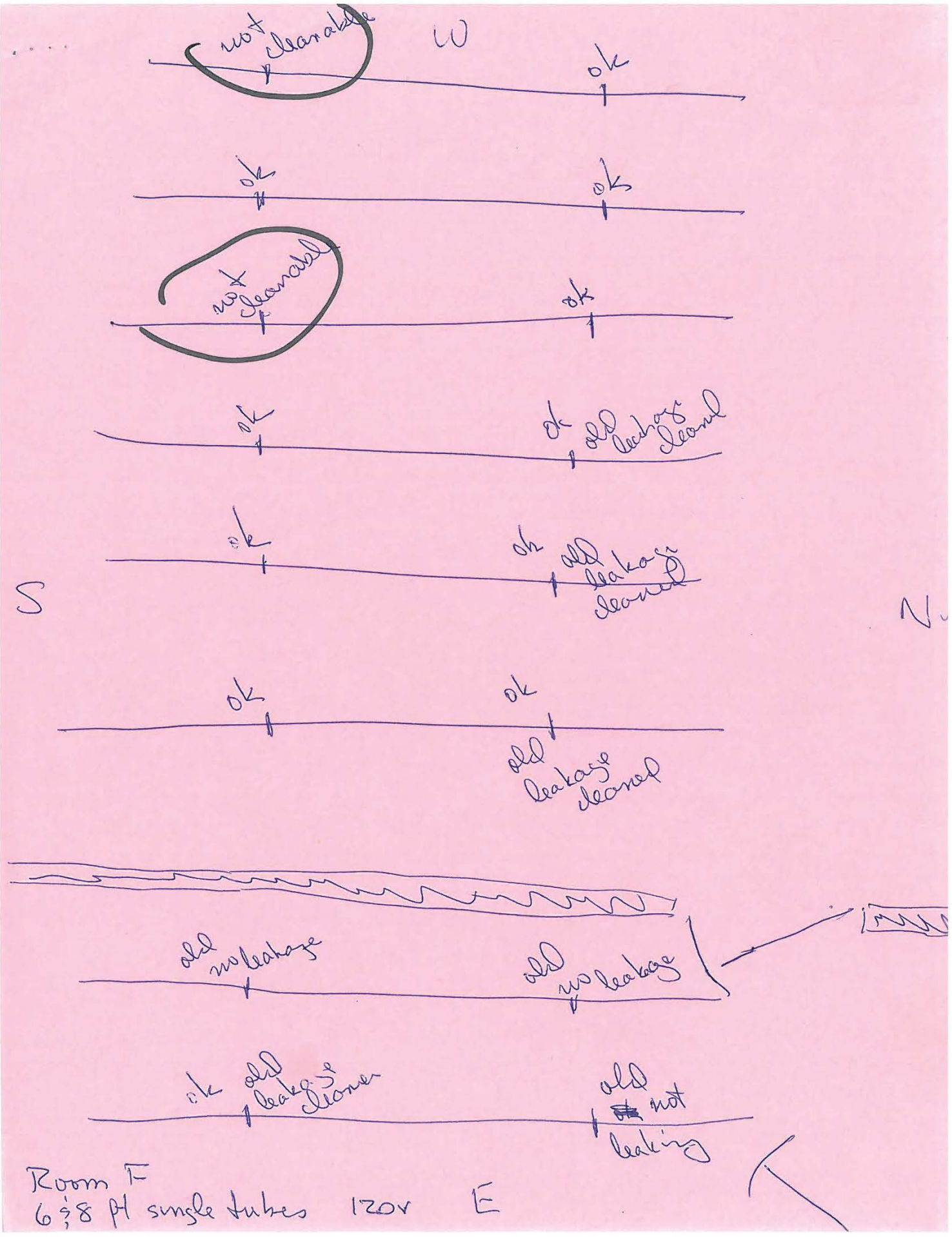


MSDG_014461


1
2
3
4
Front of room
Entry door
5
6
OLD*
Really OLD
possible leaking top
OLD*
(Really OLD)
minor leakage to ballast
OLD*
(Really OLD)
2 recessed fixtures 2 tubes each, 8' tubes 120v
ok old leakage cleaned
ok old leakage cleaned
Not sure old?
single tube fixtures 8' - 120v
Window side
Heidi's Room
Annex D

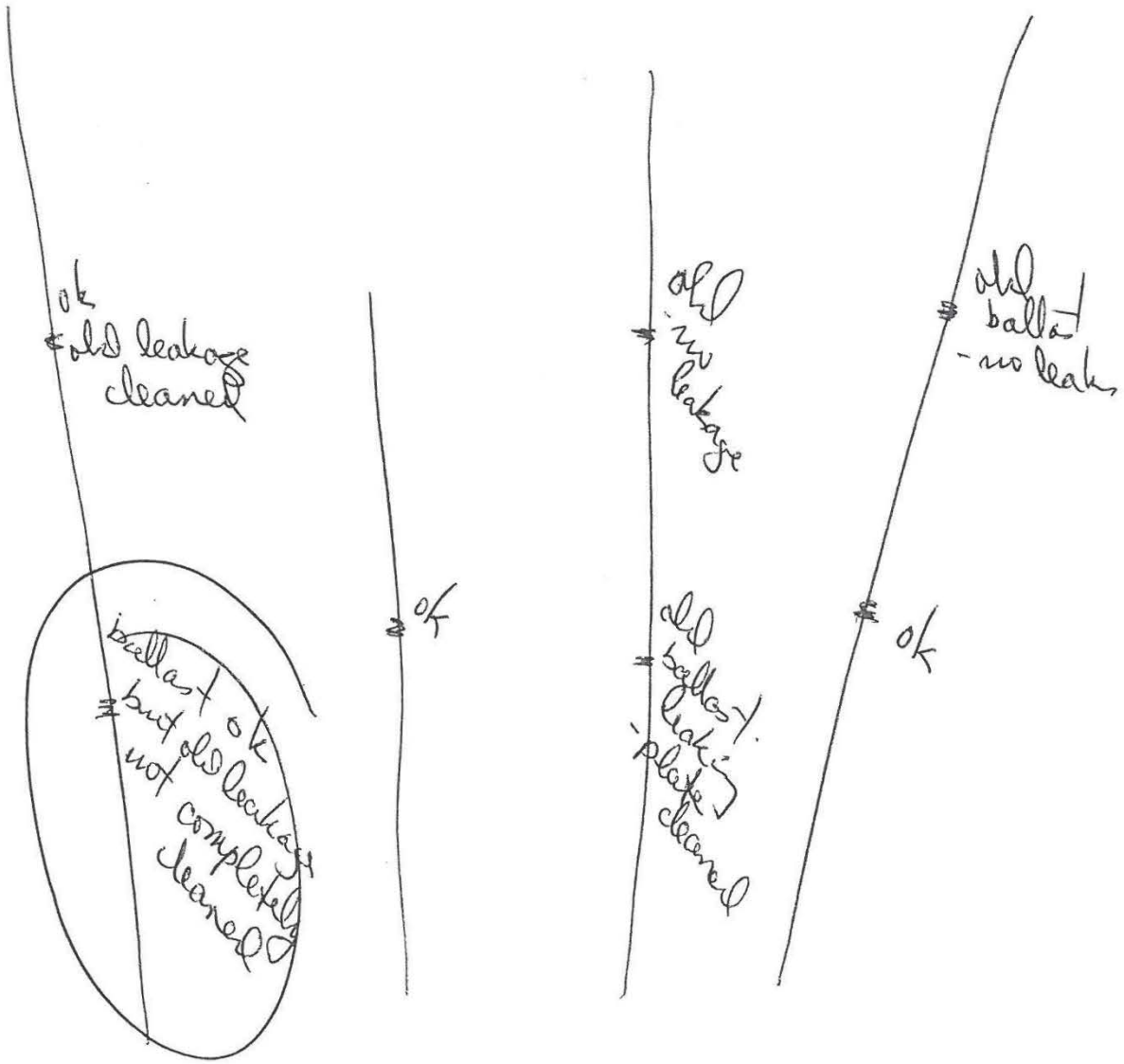
MSDG_014462

CBP classroom
W
E
S
WALL
6' 8" single tube fixtures
Not PCB
Ballast
Does not
Leak
Ballast
Ballast
Ballast
Ballast
Ballast
Ballast
Ballast
Ballast
Ballast
Ballast
Ballast


not cleanable
W
ok
ok
ok
not cleanable
ok
ok
old leakage cleaned
ok
old leakage cleaned
S
N
ok
ok
old leakage cleaned
old w leakage
old w leakage
ok old leakage cleaned
old not leaking
Room F
6 & 8 ft single tubes 120v
E

Room 4

South

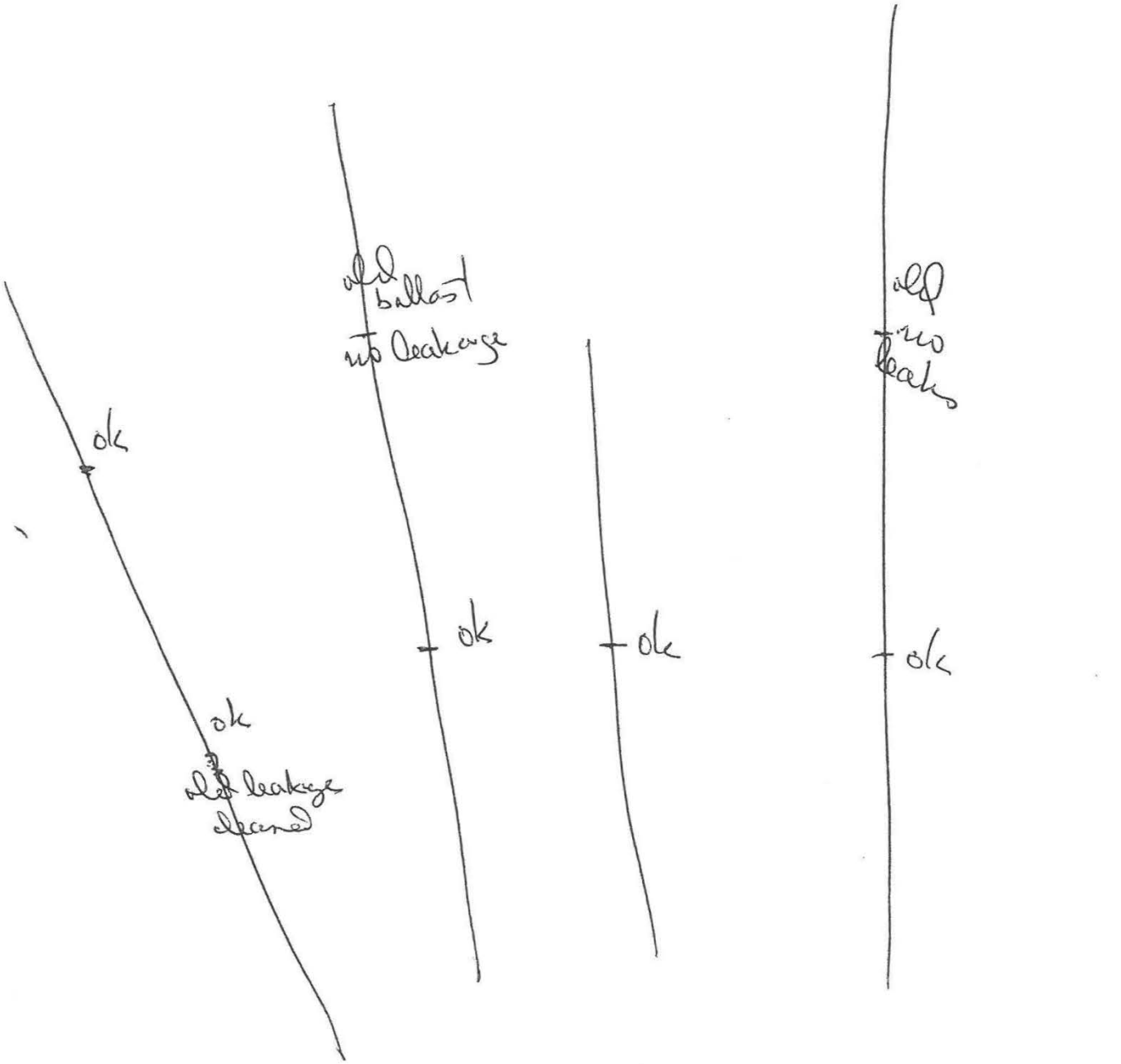


277 volt

Door

South west

Room 3

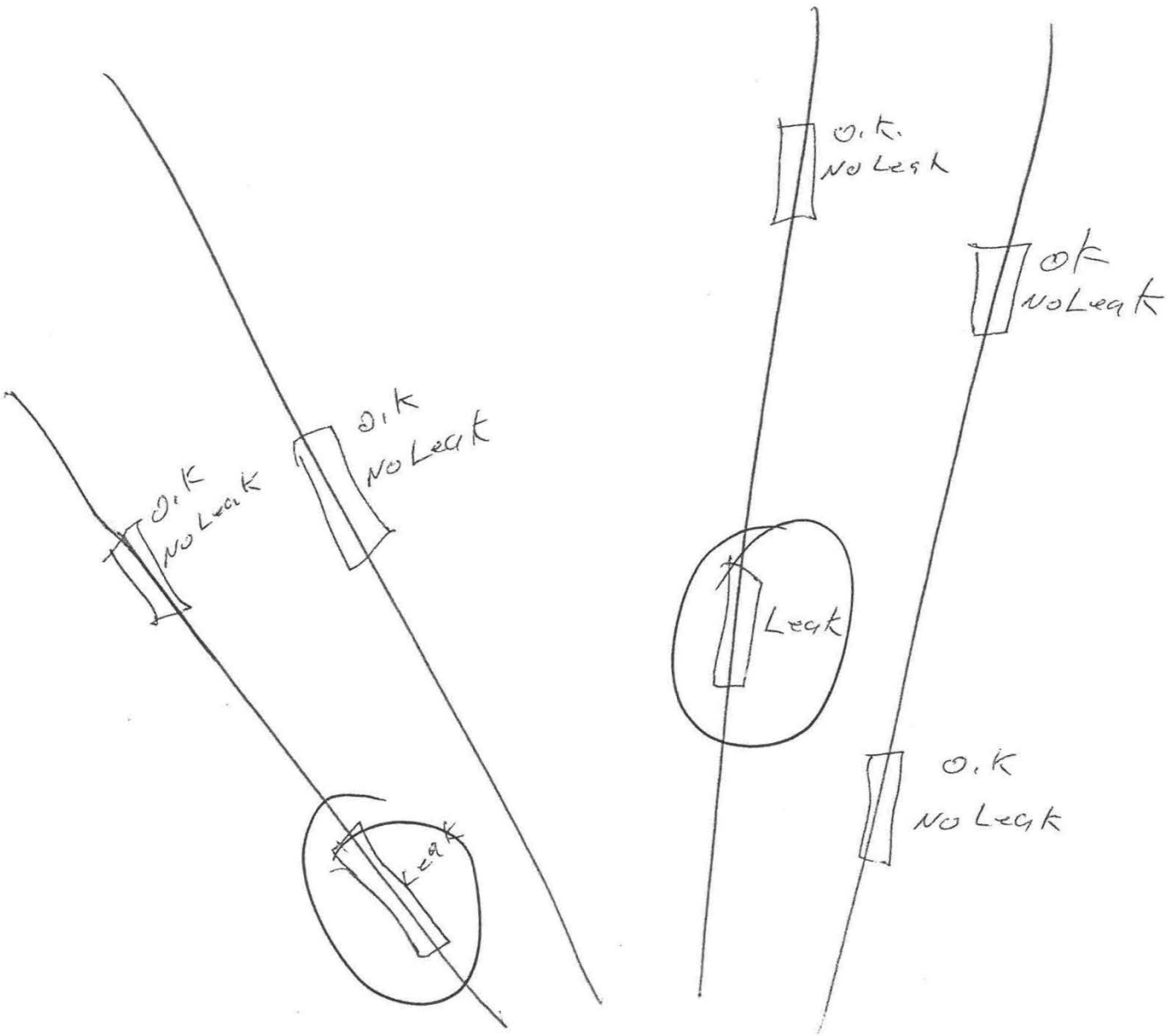


277 volt

Dom

Room 2

West


O.K
No Leak
O.K
No Leak
O.K
No Leak
Leak
O.K.
No Leak
Ok
No Leak
O.K
No Leak

Room 1 West

door

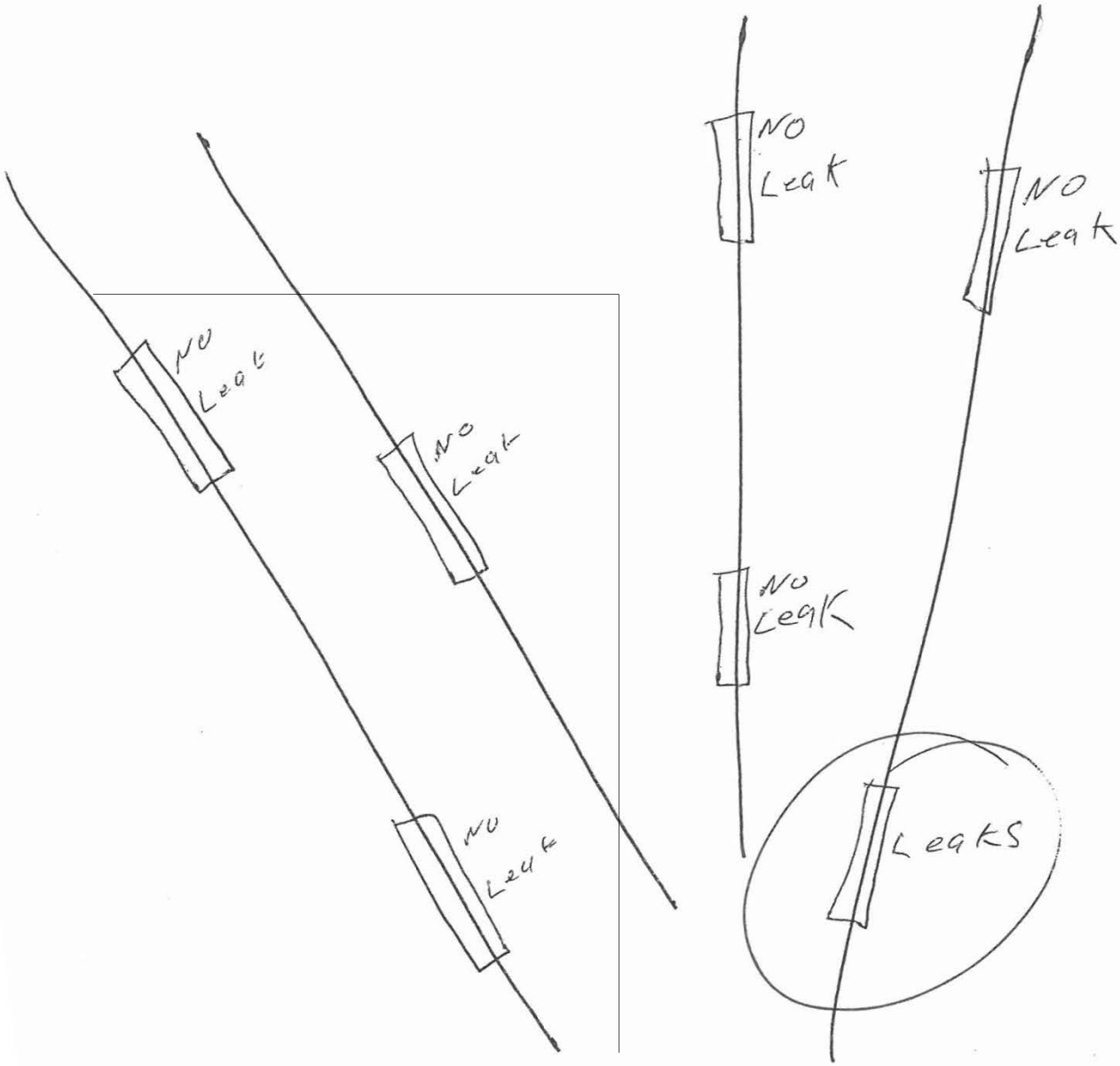


EXHIBIT U

Updated 4/21/16

000593

	Room #	Gender	Age	Parent/ Teacher/Child	Still attending ?	Years at SVEC	Burning Lungs/inflammation	Asthma/cough	GI issues/ nausea	Cognitive issues	Thyroid issue	Heavy nose bleeds	Graves Diseas
Complainant #1	8	F	adult	teacher/parent				x					
Complainant #2	multi	F	10	child					x			x	
Complainant #3	multi	M	13	child			x	x					x
Complainant #4	multi	F	8	child	yes								
Complainant #5	montessori	F	11	child	yes				x				
Complainant #6	n/a	F	adult	mom		4.5	x	x					
Complainant #7	montessori	F	11	child		4.5		x	x	x			
Complainant #8	adolescent annex	F	14	child		4.5					x		
Complainant #9	n/a	F	adult	mom		4.5							
Complainant #10	montessori +	F	12	child		4.5			x				
Complainant #11	montessori +	F	9	child		4.5							
Complainant #12	montessori +	M	7	child		4.5							
Complainant #13	montessori +	F	4	child		4.5							
Complainant #14	montessori +	M	10	child		4.5			x				
Complainant #15	montessori +	M	8	child		4.5			x			x	
Complainant #16	art and gym	F	adult	teacher		4.5	x	x	x	x			
Complainant #17	9, 11	F	adult	teacher	leave	4.5	x		x	x			
Complainant #18	6	F	adult	teacher	part-time	4.5	x						
Complainant #19	7, 19	F	adult	teacher/parent		4.5		x			x		x
Complainant #20	4, 5	F	8	child		4.5							
Complainant #21	15, Annex +	F	15	child		4.5							
Complainant #22	B, C D	F	19	child		4.5					x		
Complainant #23	13	F	adult	teacher	part-time	4.5			x	x			
Complainant #24	montessori +	F	adult	parent	part-time					x			
Complainant #25	montessori +	F	12	child	part-time						x		
Complainant #26	montessori +	F	7	child	part-time						x		
Complainant #27	montessori +	M	10	child	part-time						x		
Complainant #28	montessori +	F	5	child	part-time								
Complainant #29	library	F	adult	parent	no	1	x	x	x	x			
Complainant #30	15, North pod +	M	12	child	no	1				x			
Complainant #31	18, woodworking	M	9	child	no	1		x					

000594

Complainant #32	montessori, gym	F	8	child	no	1				x			
Complainant #33	montessori +	F	adult	parent	no	4				x			
Complainant #34	montessori +	M	16	child	no	4	x	x		x			
Complainant #35	montessori +	F	13	child	no	4				x			
Complainant #36	montessori +	M	10	child	no	4				x	x		
Complainant #37	montessori +	F	8	child	no	4							
Complainant #38	montessori +	F	10	child	part-time	1.5			x				
Complainant #39	Room #5 and PPP	M	6	child	part-time	1.5		x					
Complainant #40	montessori +	F	adult	parent	part-time	1.5					x		x
Complainant #41	9, art room	F	adult	parent	part-time	4.5			x				
Complainant #42	5	F	adult	teacher	yes	4.5				x	x		
Complainant #43	woodshop	M	adult	teacher	yes	4.5							
Complainant #44	library, art east po	F	adult	parent	no	2							
Complainant #45	library, art east po	F	11	child	no	2			x				
Complainant #46	library, art east po	F	11	child	no	2			x				
Complainant #47	23, 16, F	F	15	child	no	4.5			x		x		
Complainant #48	all over	F	adult	parent	yes	4.5					x		
Complainant #49	all over	F	19	child	no	6+					x		
Complainant #50	unsure	F	16	child	yes	?					x		
Complainant #51	math pod	F	12	child	yes	?			x				
Complainant #52	math pod	F	9	child	yes	?			x				
Complainant #53	unsure	M	6	child	?	?							
Complainant #54	22,18,15 +	F	adult	parent	yes	3				x			
Complainant #55	A, B, D, 22, 21 +	M	?	child	yes	3		x					
Complainant #56	resource, library	m	5	child	yes	2							
Complainant #57	north pod	f	9	child	yes	2							
Complainant #58	north pod	f		parent	yes	4.5				x			
Complainant #59	north pod	m	13	child	yes	4.5			x				
Complainant #60	north pod	f	11	child	yes	4.5							
Complainant #61	north pod	m	8	child	yes	4.5		x					
Complainant #62		M	adult	teacher	no	1							
Complainant #63		m	14-15	child	no	4.5			x				

000595

Sore Throat	Sinus issues	Metal taste in mouth	Immune issues/"sick all the time"	Dry Eyes/Eye issues	Dry mouth/ Blisters	Rashes/Hives	Headache	Fatigue	Seizures	Fainting/ Dizzy/Vertigo	Chest pain/racing heart	reaction at home	other		
x															
	x														
		x	x	x	x										
	x					x	x	x							
	x	x							x	x					
			x							x					
			x					x							
			x					x							
			x					x							
			x					x							
							x	x							
							x	x			x				
			x	x							x				
						x	x			x		x			
			x	x				x							
						x									
						x				x					
			x					x							
	x		x		x			x		x					
						x	x			x					
x			x				x	x							
							x	x							
x								x					precocious puberty		
x															
x								x		x					
							x	x					precocious puberty		
						x									

000596

			x					x							
							x								
x							x								
													leukemia		
													precocious puberty		
							x	x							
							x	x					asthma		
							x	x					diabetes, Hasimotos		
				x											
								x					Hashimotos		
													pneumonia		
		x													
x				x			x								
				x			x	x							
										x			pre-diabetes		
													Hashimotos		
							x						Hashimotos		
							x								
													precocious puberty		
				x							x				
													precocious puberty		
													body odor, acne, underarm swea		
				x											
								x							
								x							
								x							

updated 8/10/16

Sky Valley Education Center Complaint Spreadsheet	Rooms occupied	Gender	Age	Parent/ Teacher/Child	Still attending?	Years at SVEC	Burning Lungs/Inflammation	Asthma/cough	GI issues/nausea	Cogntive issues	Thyroid issues	Heavy nose bleeds	Graves Disease	Sore Throat	Sinus issues	Metal taste in mouth	Immune issues/"sick all the time"
Complainant #1	8	F	adult	teacher/parent	no	5		1									
Complainant #2	multi	F	10	child	no	5			1			1					
Complainant #3	multi	M	13	child	no	5	1	1			1		1	1			
Complainant #4	multi	F	8	child	yes										1		
Complainant #5	montessori	F	11	child	yes	unknown			1								
Complainant #6	n/a	F	adult	mom		4.5	1	1								1	1
Complainant #7	montessori	F	11	child		4.5		1	1	1					1		
Complainant #8	adolescent annex	F	14	child		4.5					1				1	1	
Complainant #9	n/a	F	adult	mom		4.5											1
Complainant #10	montessori +	F	12	child		4.5			1								1
Complainant #11	montessori +	F	9	child		4.5											1
Complainant #12	montessori +	M	7	child		4.5											1
Complainant #13	montessori +	F	4	child		4.5											1
Complainant #14	montessori +	M	10	child		4.5			1								
Complainant #15	montessori +	M	8	child		4.5			1			1					
Complainant #16	art and gym	F	adult	teacher		4.5	1	1	1	1							1
Complainant #17	9, 11	F	adult	teacher	leave	4.5	1		1	1							
Complainant #18	6	F	adult	teacher	part-time	4.5	1										1
Complainant #19	7, 19	F	adult	teacher/parent		4.5		1			1		1				
Complainant #20	4, 5	F	8	child		4.5											
Complainant #21	15, Annex +	F	15	child		4.5											1
Complainant #22	B, C D	F	19	child		4.5					1						
Complainant #23	13	F	adult	teacher	part-time	4.5			1	1					1		1
Complainant #24	montessori +	F	adult	parent	part-time					1							
Complainant #25	montessori +	F	12	child	part-time						1			1			1
Complainant #26	montessori +	F	7	child	part-time						1						
Complainant #27	montessori +	M	10	child	part-time						1			1			
Complainant #28	montessori +	F	5	child	part-time									1			
Complainant #29	library	F	adult	parent	no	1	1	1	1	1				1			
Complainant #30	15, North pod +	M	12	child	no	1				1	1						
Complainant #31	18, woodworking	M	9	child	no	1		1									
Complainant #32	montessori, gym	F	8	child	no	1				1							

Complainant #33	montessori +	F	adult	parent	no	4				1							1
Complainant #34	montessori +	M	16	child	no	4	1	1		1							
Complainant #35	montessori +	F	13	child	no	4				1				1			
Complainant #36	montessori +	M	10	child	no	4				1	1						
Complainant #37	montessori +	F	8	child	no	4											
Complainant #38	montessori +	F	10	child	part-time	1.5			1								
Complainant #39	Room #5 and PPP	M	6	child	part-time	1.5		1									
Complainant #40	montessori +	F	adult	parent	part-time	1.5					1		1				
Complainant #41	9, art room	F	adult	parent	part-time	4.5			1								
Complainant #42	5	F	adult	teacher	yes	4.5				1	1						
Complainant #43	woodshop	M	adult	teacher	yes	4.5											
Complainant #44	library, art east pod	F	adult	parent	no	2										1	
Complainant #45	library, art east pod	F	11	child	no	2			1					1			
Complainant #46	library, art east pod	F	11	child	no	2			1								
Complainant #47	23, 16, F	F	15	child	no	4.5			1		1						
Complainant #48	all over	F	adult	parent	yes	4.5					1						
Complainant #49	all over	F	19	child	no	6+					1						
Complainant #50	unsure	F	16	child	yes	?					1						
Complainant #51	math pod	F	12	child	yes	?			1								
Complainant #52	math pod	F	9	child	yes	?			1								
Complainant #53	unsure	M	6	child	?	?					1						
Complainant #54	22,18,15 +	F	adult	parent	yes	3				1							
Complainant #55	A, B, D, 22, 21 +	M	?	child	yes	3		1									
Complainant #56	resource, library	m	5	child	yes	2					1						
Complainant #57	north pod	f	9	child	yes	2											
Complainant #58	north pod	f		parent	yes	4.5				1							
Complainant #59	north pod	m	13	child	yes	4.5			1								
Complainant #60	north pod	f	11	child	yes	4.5											
Complainant #61	north pod	m	8	child	yes	4.5		1									
Complainant #62	F and 9	M	adult	teacher	no	1		1						1			1
Complainant #63	F and D	m	14-15	child	no	4.5			1								
Complainant #64	4	m	6	child	no	3		1									
Complainant #65	4,5	m	8	child	no	3											
Complainant #66	Montessori/Gathering	F	adult	parent	part time	4		1			1						

Complainant #67	Montessori/Gathering	F	9	child	part time	4		1									
Complainant #68	Montessori/Gathering	F	7	child	part time	4		1									
Complainant #69	Montessori/Gathering	F	5	child	part time	4		1	1								
Complainant #70	Montessori/Gathering	F	2	child	part time	4		1									
Complainant #71	North Pod Library, Gym	F	13	child	yes	2					1						
Complainant #72	North Pod Library, Gym	M	15	child	yes	2											
Complainant #73	North Pod Library, Gym	F	adult	parent	yes	2					1						
Complainant #74	multi (see email)	M	13	child	yes	4		1									
Complainant #75	multi (see email)	M	9	child	yes	4			1		1						
Complainant #76	multi (see email)	M	7	child	yes	4		1									
Complainant #77	Library, resource, 1	F	adult	parent	part time	4.5				1							
Complainant #78	multi	F	15	child	part time	4.5		1						1			
Complainant #79	multi	F	12	child	part time	4.5		1						1			
Complainant #80	multi	F	12	child	part time	4.5		1						1			
Complainant #81	3, 9, 11	M	9	child	part time	4.5		1		1				1			1
Complainant #82	ESS, Library	F	adult	parent	yes	2	1	1			1						
Complainant #83	gym, 1, 15, 17, wrestling	F	5	child	yes	1		1	1	1					1		
Complainant #84	library, gathering...	F	2	child	yes	1		1	1								
Complainant #85	unknown	F	unknown	child	?	?											
Complainant #86	montessori and adolescent wing	F	14	child	yes	unknown						1					
Complainant #87	all over and gathering room	F	adult	parent	yes	unknown		1									
Complainant #88	all over, Library	F	adult	parent	yes	1									1		
Complainant #89	Math pod, east pod, room #9 and #10	M	13	child	yes	1				1		1			1		
Complainant #90	Band, Library	F	3	child	yes	1									1		
Complainant #91	ESS, Montessori Annex	F	14	child	yes	4.5				1	1						
Complainant #92	Montessori - #6	m	13	child	yes	4.5		1									
Complainant #93	ESS and #11	F	14	child	yes	2											
Complainant #94	ESS and more	m	17	child	yes	4		1									
Complainant #95	Annex, ESS	f	13	child	yes	4	1										1
Complainant #96	Library	F	adult	parent	yes	4			1								1
Complainant #97	#9, #11	F	9	child	yes	5											1
Complainant #98	library, gathering...	F	adult	parent	yes	1	1	1	1					1			

Complainant#99	11, 8, 10, Annex, 14	M	12	child	yes	2		1						1			
Complainant #100	11, 8, montessori, 8, Annex, Gym, 18, 20	M	10	child	yes	2		1	1					1	1		
Complainant #101	Library	F	adult	parent	no	5											
Complainant #102	11, 9, Choir, Art	M	10	child	no	5						1					
Complainant #103	11, 9, Choir, Art	M	7	child	no	5						1					
Complainant #104	11, 9, Choir, Art	F	12	child	no	5											
Complainant #105	All over, Room #8, Art, English, nothing in Annex	F	18	child	part time	5											
Complainant #106	Mainly Montessori pod, woodworking, gym	M	12	child	yes	5			1		1						
Complainant #107	Marquart, Olsen, Leahy, Mullen-Deland, North pod, ESS building	F	16	child	no	5				1							1
Complainant #108	Marquart, Olsen, Leahy, Mullen-Deland, North pod, ESS building	M	14	child	part time	5				1							
Complainant #109	Gathering room, Math pod, Marquart, Olsen, Leahy, Mullen-Deland, ESS building	F	adult	parent	no	5				1							1
Complainant #110	all over	F	7	child	yes	1		1									1
Complainant #111	all over	M	5	child	yes	1		1									1
Complainant #112	gathering room/library	M	4	child	yes	1		1	1								1
Complainant #113	gathering room/library	M	2	child	yes	1		1									1
Complainant #114	Annex A, #4 and #5	F	8	child	no	1											
Complainant #115	Annex A, #4 and #5	F	4	child	no	1											
Complainant #116	#3 and many other classrooms	F	adult	parent	yes	5	1									1	

Complainant #117	A and C	F	14	child	yes	5			1								
Complainant #118	6	M	12	child	yes	5					1						
Complainant #119	6	M	10	child	yes	5					1						
TOTALS							11	38	29	23	26	6	3	14	10	4	23
							Burning Lungs/inflammation	Asthma/cough	GI issues/nausea	Cogntive issues	Thyroid issues	Heavy nose bleeds	Graves Disease	Sore Throat	Sinus issues	Metal taste in mouth	Immune issues/"sick all the time"

Dry Eyes/Eye Issues	Dry mouth/Blisters	Rashes/Hives	Headache	Fatigue	Seizures	Fainting/ Dizzy/Vertigo	Chest pain/racing heart	reaction at home	other
				1				1	burning in nose and mouth
									Graves disease
			1						
1	1								
		1	1	1					
					1	1			
						1			
				1					
				1					
				1					
				1					
			1	1					
			1	1			1		
1							1		
		1	1			1		1	
1				1					
		1							
		1				1			
				1					
	1			1		1			
		1	1			1			
			1	1					
			1	1					
				1					precocious puberty
				1		1			
			1	1					precocious puberty
		1							

				1					
			1						
			1						
									leukemia
									precocious puberty
			1	1					
			1	1					asthma
			1	1					diabetes, Hasimotos
1									
				1					Hashimotos
									pneumonia
1			1						
1			1	1					
						1			pre-diabetes
									Hashimotos
			1						Hashimotos
			1						
									precocious puberty
1							1		
									precocious puberty
									body odor, acne, underarm sweating
1				1					
				1					
				1					
1			1			1			
				1					
			1						
			1						

		1							
									Hasimotos
									Aspergers - Disruptive mood disorder
			1	1					adrenal issues, hypothyroid diagnosis
			1	1		1			
			1						
			1						
				1					
			1						hyperthyrodism -- Graves
		1							
		1							PCB bloodwork
				1					
			1						
				1					
				1					in room when ballast leaked
				1					
			1	1					
			1						
			1						
			1	1					
			1	1		1			

			1						
1			1						
									shallow breathing, clearing throat
			1						
			1	1	1	1			
		1	1						
		1	1	1					abnormal thyroid
			1	1					
			1	1					
		1	1	1					receeding gums
		1							Skin peeling on feet
		1							PCB bloodwork - levles off the charts Skin peeling on feet
			1	1			1		

	1		1	1			1		
			1						mustache at age 12
	1	1							body odor since 3rd grade, welts
10	4	15	44	43	2	12	5	2	
Dry Eyes/Eye issues	Dry mouth/Blisters	Rashes/Hives	Headache	Fatigue	Seizures	Fainting/ Dizzy/Vertigo	Chest pain/racing heart	reaction at home	

EXHIBIT V


PCB Light Fixture Cleaning
PORTABLE 1
DISTRICT STORAGE
DISTRICT STORAGE
PORTABLE 2
SKY VALLEY EDUCATION CENTER
Core Instruction
Special Education
Special Education Support
Elective / Specialist / PE
Support
Restrooms
Hallways / Foyers
Administration/ Staff Rooms
Conference Rooms
Storage / Mech Spaces
BUILDING 4
TECHNOLOGY ED
BUILDING 5
PODS / LIBRARY
Library
BUILDING 1
OFFICE
Small Gym
Locker Room
Locker Room
Large Gym
BUILDING 3
GYMNASIUM
BUILDING 2
ANNEX
Legand
Fixture cleaning needed

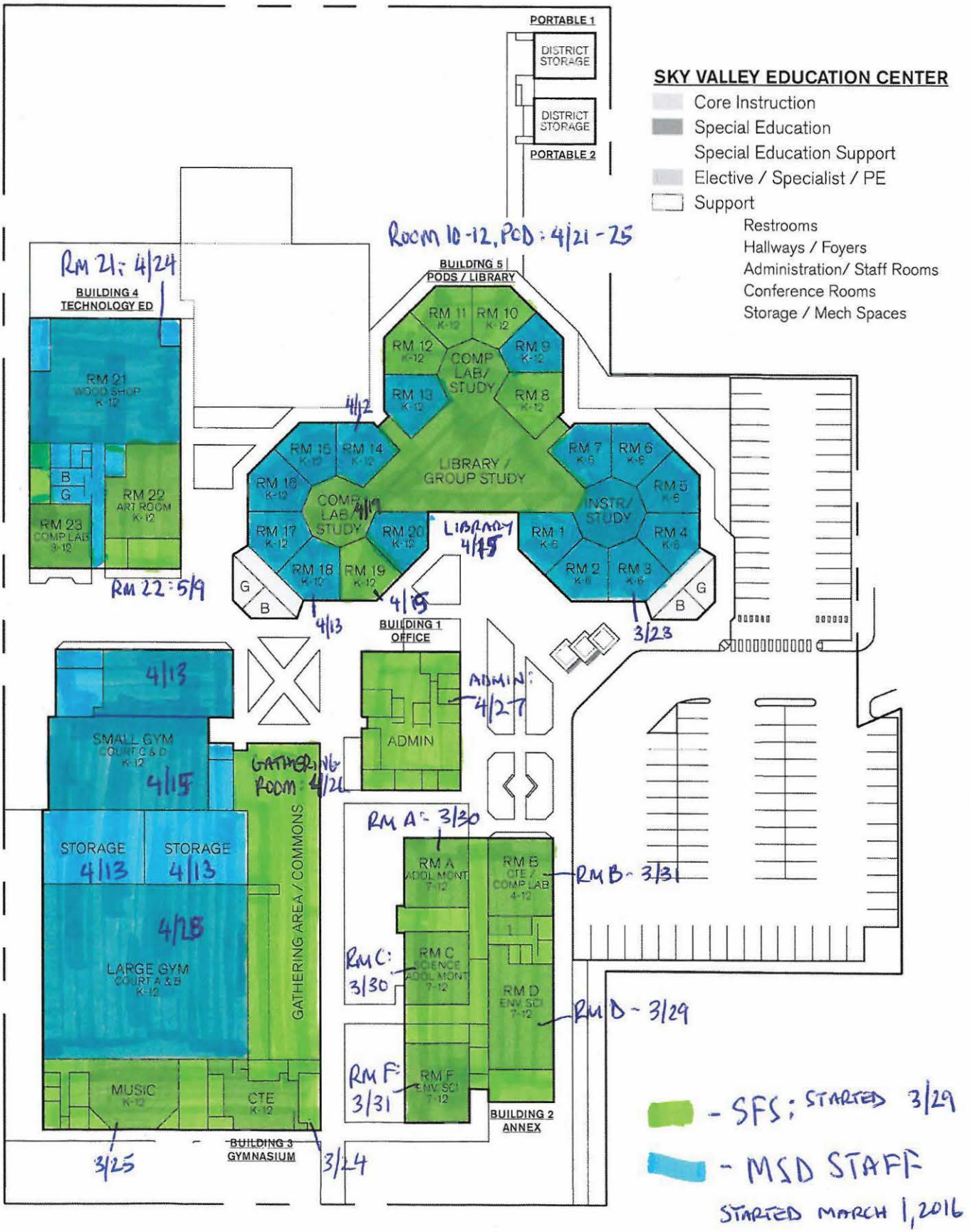

PORTABLE 1
DISTRICT STORAGE
DISTRICT STORAGE
PORTABLE 2
SKY VALLEY EDUCATION CENTER
Core Instruction
Special Education
Special Education Support
Elective / Specialist / PE
Support
Restrooms
Hallways / Foyers
Administration/ Staff Rooms
Conference Rooms
Storage / Mech Spaces
Room 10-12, POD: 4/21-25
RM 21: 4/24
BUILDING 4 TECHNOLOGY ED
RM 21 WOOD SHOP K-12
RM 22 ART ROOM K-12
RM 23 COMP LAB 3-12
B
G
RM 22: 5/9
BUILDING 5 PODS / LIBRARY
RM 11 K-12
RM 10 K-12
RM 12 K-12
COMP LAB/ STUDY
RM 9 K-12
RM 13 K-12
RM 8 K-12
4/12
RM 15 K-12
RM 14 K-12
LIBRARY / GROUP STUDY
RM 7 K-6
RM 6 K-6
RM 16 K-12
COMP LAB/ STUDY 4/19
INSTR/ STUDY
RM 5 K-6
RM 17 K-12
RM 20 K-12
LIBRARY 4/15
RM 1 K-6
RM 4 K-6
RM 18 K-12
RM 19 K-12
RM 2 K-6
RM 3 K-6
G
B
4/13
4/15
3/23
BUILDING 1 OFFICE
ADMIN
ADMIN: 4/27
4/13
SMALL GYM COURT C & D K-12
4/15
GATHERING ROOM: 4/26
GATHERING AREA / COMMONS
RM A: 3/30
STORAGE 4/13
STORAGE 4/13
4/28
LARGE GYM COURT A & B K-12
RM A MODL MONT 7-12
RM B CTE / COMP LAB 4-12
RM B - 3/31
RM C: 3/30
RM C SCIENCE MODL MONT 7-12
RM D ENV SCI 7-12
RM D - 3/29
RM F: 3/31
RM F ENV SCI 7-12
MUSIC K-12
CTE K-12
BUILDING 2 ANNEX
BUILDING 3 GYMNASIUM
3/25
3/24
- SFS: STARTED 3/29
- MSD STAFF STARTED MARCH 1, 2016

EXHIBIT W1

SNOHOMISH
HEALTH DISTRICT
WWW.SNOHD.ORG

Environmental Health Division

June 2, 2016

John Mannix, Assistant Superintendent, Operations
Monroe School District
200 E Fremont St
Monroe, WA 98272-2336

Devlin Piplic, Director of Facilities
Monroe School District
200 E Fremont St
Monroe, WA 98272-2336

Karen Rosencrans, Principal
Sky Valley Education Center
351 Short Columbia St.
Monroe, WA 98272

Subject: RESTRICTED ACCESS TO ANNEX BUILDING
School Environmental Health and Safety Complaint Investigation
Name of School: Sky Valley Education Center
Location: 351 Short Columbia Street, Monroe, Washington 98272

Dear Mr. Mannix, Mr. Piplic and Ms. Rosencrans:

Our office received an electronic response from Monroe Public Schools on May 26, 2016 regarding our ongoing complaint investigation at Sky Valley Education Center. Since December 1, 2015, over 90 parents, teachers and children have reported illness that they associate with the building.

All of the rooms that were retested during the PCB air sampling resulted in levels higher than originally reported.

- Room A: 630 ng/m3
- Room C: 450 ng/m3
- Room C/A Prep: 480 ng/m3
- Room D: 430 ng/m3
- Room F: 210 ng/m3
- Annex Hallway East: 390 ng/m3
- Annex Hallway West: 390 ng/m3
- Girl's bathroom: 180 ng/m3
- Room #11: 260 ng/m3

WAC 246-366-140 states, "the existence of unsafe conditions which present a potential hazard to occupants of the school are in violation of these regulations." Effective May 27, 2016, Monroe Public Schools has closed Room A. The elevated PCB air sampling levels above the EPA Rfd warranted a closure of that room.

Irrespective as to the reason as to why the PCB levels have increased, exposure must be limited to the most vulnerable student population while further remediation and air scrubbing activities are on-going.

In addition, The Snohomish Health District is requiring that the remainder of the Annex Building and Room #11 be inaccessible to **children under 12 and pregnant mothers** until follow-up testing is completed to show that PCB levels are in an acceptable range. Since PCB levels were noted to be close to 500 ng/m3 in a few areas of Annex, it is best practices to limit access to the rest of the Annex Building and Room #11 by only allowing children 12 and older in the Building for the last few weeks of school.

It is unacceptable that there are still light fixtures that have not been cleaned in the Office, Technology, Gyms and Office area. To avoid additional closure requirements, please provide documentation that this work has been done, including additional documentation as specified in the May 25, 2016 letter, by June 9, 2016.

The Corrective Action Plan regarding PCB-containing caulk and paint should be finalized with the EPA. Please provide documentation by June 9, 2016 that staff and students have been notified to not touch or come in contact with the PCB-containing caulk or PCB-containing paint.

Additional mold abatement, roof repair, unit ventilator cleaning and carpet removal must be addressed by an August 31, 2016 walk-through of the school.

We would like to schedule a site visit on Monday June 6, 2016 at 10 a.m. to ensure that the Annex has been closed to younger students and proper signage posted at Room #11.

I am available to answer any questions at 425.339.8781.

Sincerely,

Jefferson Ketchel, MA, RS
Director, Environmental Health Division

JK/AZ:jg

cc: Nancy Bernard, Washington State Department of Health
Dr. Fredrika Smith, Superintendent, Monroe School District No. 103
Michelle Mullen, EPA Region 10
Nancy Beaudet, Pediatric Environmental Health Specialty Unit
Lauren Jenks, Washington State Department of Health
Gary Goldbaum, Snohomish Health District

EXHIBIT W2

SNOHOMISH
HEALTH DISTRICT
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Environmental Health Division

June 29, 2016

John Mannix, Assistant Superintendent, Operations
Monroe School District
200 E Fremont St
Monroe, WA 98272-2336

Devlin Piplic, Director of Facilities
Monroe School District
200 E Fremont St
Monroe, WA 98272-2336

Karen Rosencrans, Principal
Sky Valley Education Center
351 Short Columbia St
Monroe, WA 98272

Subject: RESPONSE TO THE CORRECTIVE ACTION PLAN
School Environmental Health and Safety Complaint Investigation
Name of School: Sky Valley Education Center
Location: 351 Short Columbia Street, Monroe, Washington 98272

Dear Mr. Mannix, Mr. Piplic and Ms. Rosencrans:

The Snohomish Health District (Health District) received a copy of the Corrective Action Plan from Monroe Public Schools on May 26, 2016, and an addendum on June 9, 2016 regarding the ongoing complaint investigation at Sky Valley Education Center. Since December 1, 2015, over 100 parents, teachers and children have reported illness that they associate with the building

WAC 246-366-140 states, "the existence of unsafe conditions which present a potential hazard to occupants of the school are in violation of these regulations." In an effort to comply with this requirement, as well as those outlined in Health District letters of April 25, 2016 and June 2, 2016, it is our understanding that the School District has taken a number of actions. Additionally, the School District has prepared a "Corrective Action Plan for Sky Valley Education Center" dated May 25, 2016 as well a letter (addendum) to the Health District dated June 9, 2016. As stated in these documents, the School District intends to complete all described work by August 31, 2016. The Snohomish Health District appreciates the School District's intended diligence to remediate issues at the facility.

As a condition for opening the school for use this fall for the 2016-2017 school year, the Health District is requiring satisfactory completion and acceptance by the Health District of all remediation, cleanup, repair and testing measures as outlined in the Corrective Action Plan and the later addendum.

To this end, the Snohomish Health District accepts the actions outlined in items 1-8 of the May 25 Corrective Action Plan. In particular, we expect completion of additional air testing in all the rooms that had elevated levels of PCBs as detailed in Item 6. The Health District requires that air testing from these rooms, and any other rooms that are tested for PCBs in the air due to caulk removal, confirms PCB levels are below a concentration of 100 ng/m3.

Be advised, SHD will not approve opening the school for the 2016- 2017 school year if the concentrations of PCBs in the air are not below 100 ng/m3 in all the rooms tested. Additionally, the Health District looks forward to receipt of information regarding the PCB caulk testing as outlined in the June 9 letter (addendum).

The Snohomish Health District expects regular and continuous update/communication with the School District regarding the remediation process over the coming months prior to the August 31, 2016 completion date. Consequently, the Health District will be in contact and/or conduct site visits a minimum of every two (2) weeks to confirm the project is on track to meet the deadline. Amanda Zych will schedule these check-ins with Devlin Piplic.

I am available to answer any questions at 425.339.8781.

Sincerely,

Jefferson Ketchel, MA, RS
Director, Environmental Health Division

JK/AZ:ss

cc: Nancy Bernard, Washington State Department of Health
Dr. Fredrika Smith, Superintendent, Monroe School District No. 103
Michelle Mullen, EPA Region 10
Nancy Beaudet, Pediatric Environmental Health Specialty Unit
Lauren Jenks, Washington State Department of Health
Hans Dunshee, Snohomish County Council
Jeff Rasmussen, Monroe City Council
Gary Goldbaum, Snohomish Health District