

STATEMENT OF
HONORABLE RUSSELL E. TRAIN
ADMINISTRATOR
ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
SUBCOMMITTEE ON FISHERIES AND WILDLIFE
CONSERVATION AND THE ENVIRONMENT
COMMITTEE ON MERCHANT MARINE AND FISHERIES
HOUSE OF REPRESENTATIVES
JANUARY 28, 1976

Good afternoon Mr. Chairman, and members of the subcommittee. I am appearing today to discuss the problems created by the widespread presence of polychlorinated biphenyls, or PCBs, in the environment, and actions which the Environmental Protection Agency is taking to reduce or eliminate those problems.

PCBs are a significant hazard to human health and the environment. Laboratory tests show they cause reproductive failures, gastric disorders, skin lesions, and tumors in mammals. Their destructive effects on fish and wildlife are well documented.

However, the PCB problem is but one dimension of a much larger picture of environmental degradation by toxic chemicals. The picture is a dismaying one, as the numbers of different chemicals, amounts manufactured, the uses, and the accumulation in the environment each increase. Incidents of adverse effects on health or the environment have in recent years brought home to us that our ever-increasing use of toxic chemicals poses an ever larger and more hazardous threat to the environment. Further, the history of governmental response to these incidents reveals that, while our authority to act and ability to develop some form of remedies have both improved, we are still fighting a rear-guard action, all too often in a position only to cure and not prevent. While one problem is being solved others are suddenly exploding, or incubating unknown to those who will have to deal with the unhappy results. In the meantime, those other factors -- increasing numbers, amounts, uses, and accumulation of chemicals -- mean the environmental burden grows heavier and heavier.

JACH CC8594



Let me recall for you some of the warning signs in recent years.

Hexachlorobenzene is a chemical produced as a by-product during the manufacture of several other chemicals. Relatively small amounts have been used as a seed dressing. EPA's concern was triggered when cattle grazing near a chemical wastes disposal dump in Louisiana were found to have levels of the chemical that exceeded the guidelines for meat.

The inadvertent mixing of polybrominated biphenyls, a fire retardant added to plastics with cattle feed, has resulted in tens of millions of dollars in damages sought by farmers owning contaminated animals.

For many years we were unaware of the carcinogenic potential of the major industrial chemical vinyl chloride, and only now are we beginning to effectively contain the chemical.

Asbestos, which is used widely throughout our economy, is known to be a serious health hazard when inhaled. There remain many questions concerning the relative effect of several forms of asbestos fibers, as well as uncertainty as to the effects of ingestion. Finally, limited steps have been taken to reduce exposure to asbestos.

Gross population declines of several flesh-eating wild bird species in the U.S. have been caused by DDE residues resulting from DDT use. In 1969-1970, for example, 1,852 nesting attempts by brown pelicans on Anacapa Island off the coast of California produced but 9 young.

Reproduction of grebes was halted on Lake St. Clair, near Detroit. This was traced to mercury from chlor-alkali plants in the region.

Dozens of dead blue and snow geese were found in Missouri in April 1974 during the bird's northward migration. These birds contained lethal levels of dieldrin in the brain although this compound was not used locally. It was hypothesized that exposure occurred 600 miles to the south in rice growing areas.

These examples have one thing in common - damage to fish and wildlife or man from chemicals in the environment - but they differ in that EPA has authority to deal with some problems but not others. Thus, DDT and dieldrin are both pesticides and have no other uses; we have therefore acted under the Federal Insecticide, Fungicide, and Rodenticide Act to eliminate most uses. Thus, we have controlled their adverse environmental effects, although the full environmental

benefits may not be realized for some time as the amounts already in the environment only gradually degrade or are removed from active biological cycles. The uses of hexachlorobenzene and mercury include pesticides, but pesticide uses are only a small part of those substances entering the environment. We have no authority to control other uses and must rely on the Federal Water Pollution Control Act and the Clean Air Act to achieve partial control.

In the case of mercury we have succeeded in reducing the flow into the aquatic environment, which we judge to be the critical element. On the other hand, reductions in hexachlorobenzene reaching the environment have been due largely to voluntary actions by industry coupled with State regulation.

Asbestos and PCBs are illustrative of substances where our authority is limited to regulating air and water emissions and ambient levels -- a particularly awkward situation in that persistent chemicals are occurring in different media and having different uses. PCBs offer an excellent example of the need for more comprehensive authority.

We now estimate that over the past 45 years, some 1.4 billion pounds of PCBs have been produced in the United States. Of that amount more than half has already entered the environment through discharges to the air, water and land. Although some of this has been chemically or biologically degraded, the vast majority is contained in landfills, contaminated soils, bottom sediments of rivers, lakes, and coastal waters. Unfortunately, there appears to be relatively little we can do to remove PCBs from the environment, and it may be many years before some of our waters will again be suitable for commercial or recreational fisheries.

At present there are over seven hundred million pounds of PCBs currently in use or inventory in electrical equipment such as transformers and capacitors, hydraulic equipment, paper products, and other commercial and industrial products. Without preventive measures, essentially all of these PCBs could ultimately enter the environment and add to the existing soil, sediment, air and water concentrations that I just described. A large part of this amount can be kept from entering the environment if effective disposal and use practices are followed. The remainder may be virtually uncontrollable and will result in a continuing addition to the environmental burden.

We are producing domestically 35-40 million pounds per year. We are importing about one-half million pounds as a chemical, and an unknown amount in PCB-containing products.

In 1975 we found that although PCB levels in most foods have steadily declined, PCBs remain present in our environment to a far greater degree and at higher levels than we would have thought. PCBs are highly persistent - more so than DDT - and bio-accumulate in the food chain. PCB contamination is pervasive in the environment. We have found high PCB levels -- levels greatly exceeding FDA guidelines of 5 ppm -- in fish taken from the Great Lakes, the upper Mississippi River, off the Southern California coast, streams entering the Gulf of Mexico, in the Hudson River and other waterways in New York State. Specifically, high concentrations of PCBs have been detected in recent months in fish in Lake Michigan (up to 165 ppm), Lake Pepin (up to 40 ppm), and in the Hudson River (up to 350 ppm), although the average levels are significantly lower. The presence of PCBs in these waters threatens to destroy commercial and sport fishing and associated industries, since contaminated fish are rendered unfit for human consumption and some fish become incapable of effective reproduction.

The evidence we have accumulated over the past three years has underscored our original concern over the toxicity of PCBs and over the potential health hazard posed by the presence of high PCB concentrations in water and in fish. It indicates that the most serious potential health problem from PCBs which we are able to identify today would come from eating fish which contain high levels of PCBs. Until environmental levels go down substantially, the human health threat from PCBs can only be controlled through not eating fish that exceed the limits prescribed by FDA.

With hindsight, EPA probably should have moved more aggressively to attack PCB discharges into the aquatic environment during the past several years. However, it is important to recognize that annual point source discharges from manufacturers of PCBs and electrical equipment containing PCBs -- which represent the bulk of the discharges which we can effectively address under existing authorities -- probably total less than 10,000 pounds per year. At the same time we estimate that many millions of pounds of PCBs are probably entering the aquatic environment annually through other routes.

The PCB problem, and expected similar problems, can be effectively dealt with only through authority we do not yet have. Until the Congress passes toxic substances control legislation, we must rely to a large extent on voluntary actions by industry. Let me explain. In 1971, a Federal inter-agency task force was formed to address the question: what do we know and what should be done about PCBs in the environment? At that time, PCBs had been in wide industrial use in the United States for about 40 years. Approximately 80 million pounds were being domestically produced annually. These PCBs were used in a great variety of commercial and industrial products. The task force concluded in 1972 that PCBs were highly persistent, could be found in all parts of the environment, could "bioaccumulate" to unacceptably high levels in fish, and could have serious adverse effects on human health.

The task force recommended--and the Federal Government adopted--a policy of urging private industry to confine PCB use to closed electrical systems, where there were no adequate and safe substitutes.

The Monsanto Company, the sole American producer of PCBs, had already voluntarily restricted sales of PCBs to uses in closed electrical systems. The American National Standards Institute issued guidelines for industry on the use, disposal and labelling of PCBs. The Environmental Protection Agency announced that it would take steps to limit discharges of industrial effluents of PCBs into rivers and lakes. The Food and Drug Administration established temporary tolerances for PCBs in several types of food and set limits on PCB contamination in food packaging and in food processing plants. In addition, the General Services Administration stopped purchase of PCB-containing paper by the Federal government and the Department of the Interior prohibited future use of PCBs in off-shore oil operations. Other nations also took action. Under an Organization for Economic Cooperation and Development Council Decision in 1973, member countries agreed to severely restrict uses of PCBs to certain closed systems; additionally, the OECD Council Decision recommended that member countries further restrict PCB uses whenever possible.

At that time, we believed that these measures would take care of the PCB problem and enable us to continue to take advantage of the unique properties of PCBs while protecting the public and the environment from exposure to hazardous levels of these chemicals. Since 1971, annual U.S. sales of PCBs have been cut in half.

Today, however, we know much more needs to be done. Despite the voluntary actions described, high levels of PCBs remain in and continue to enter the environment. Last November, EPA sponsored a National Conference on PCBs in Chicago to examine the latest scientific findings on PCB's environmental and health effects, and to identify needed control actions. As a result of new evidence indicating the urgency of the problem, I announced on December 22, 1975, these actions:

1. The immediate establishment of requirements to virtually eliminate PCBs from the process wastes of all manufacturers of PCBs and of capacitors and transformers that utilize PCBs. I instructed each of our Regional Offices to take steps to review and amend, if necessary, all waste water discharge permits for such installations, and this activity is currently under way. By March 1 on-site surveys of 50 facilities will have been conducted and by April 1 the process of revising discharge permits for each of these facilities will have been initiated.
2. The issuance of proposed regulations to control the environmental damage that results from spills of hazardous substances, including PCBs. EPA will move as rapidly as possible to finalize these regulations after a public comment period.
3. A request to all State Governors asking them to examine carefully and to apply their authorities to deal with the PCB problem. We are particularly concerned about solid waste disposal problems and effluent discharges into municipal systems, and believe that the States can be particularly helpful in these areas.
4. A request to the heads of selected Federal agencies asking them to inventory their uses of PCBs and PCB-containing materials and to develop plans to assure adequate management and safe disposal of these materials. Follow-up meetings with the Agencies have been held, and detailed activities are being worked out.

5. Initiation of a number of other programs to find ways to eliminate the environmental discharges from other sources of PCB's including paper recycling operations, the investment casting industry, uses in hydraulic systems, and the disposal of electrical consumer products which contain PCBs.

In addition, during the past several weeks, I have met with representatives of more than 25 companies and trade associations involved in the manufacture of transformers and capacitors containing PCBs and urged their cooperation in seeking alternative approaches to PCBs. Also, I have met with representatives of a number of electrical utilities, transit authorities, and railways who are principal users of electrical equipment containing PCBs to begin to develop additional ways to prevent PCBs from being discharged into the environment. These consultations will continue in the months ahead until we have these aspects of the problem under control.

These actions are based on our conclusion that, in order to stop the growth of the PCB threat, the nation must phase out production and importation of PCBs and products containing PCBs, and assure to the extent possible that PCBs presently in use do not enter the environment.

But the important question is, how do we get beyond cure to prevention of this kind of problem?

Over the five years since Toxic Substances legislation was first proposed, an estimated 1,000 chemical compounds have been introduced into the commercial market each year. This has happened without systematic advance assessment of their potential impact upon public health or the environment.

All of the Toxic Substance Control bills now before the Congress set forth essential authorities which would greatly strengthen our hand in beginning to control the problem of toxic substances entering the environment. The bills would enable us to keep track of chemical substances being manufactured, processed, or imported. We could require the testing of chemicals which appear to pose a risk to health or the environment and are not covered adequately by other laws. We could take immediate action against particularly hazardous chemicals.

There are other important authorities common to all the bills as well, but the point is clear: the bills would plug the serious gap in Federal authority revealed by some of the cases I have described today. The Administration has announced its support for H.R. 7664 with amendments and I understand that a formal communication on this bill will be forwarded to the Congress in the near future.

In conclusion, Mr. Chairman, I believe that the PCBs and similar problems can be viewed as warning signs. In the face of the burgeoning role of chemicals in the world, we must be able to take all due action to prevent the sort of environmental contamination which PCBs have caused. We cannot rely on half-measures and spotty, limited authority. We cannot wait until a risk-posing chemical is out in the economy before beginning to address the problems it presents. And we should not use our citizens and the nation's fish and wildlife resources to learn what the problems are.

Mr. Chairman, that concludes my prepared remarks. I will answer any questions you may have.

ADM CC86C1



UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
230 SOUTH DEARBORN ST
CHICAGO, ILLINOIS 60604



JUN 4 1976

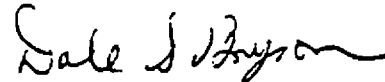
Mr. R. W. Flint, Plant Manager
Monsanto Industrial Chemicals Company
Sauget, Illinois 62201

Dear Mr. Flint:

In response to a telephone request from Mr. Paul Heisler of Monsanto we are sending "preliminary" materials developed by EPA in regard to atmospheric emissions from the Krummrich plant. This material is further support of my letter to you of May 7, 1976 and would be discussed at the meeting proposed in your letter of May 19, 1976.

Questions may be referred to Howard Zar (312-353-1472) or R. Edwin Zylstra of this office.

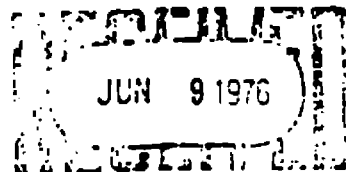
Very truly yours,



Dale S. Bryson, Acting Director
Enforcement Division

Enclosure

March 9 memorandum from Chief, Air Surveillance Branch and attachments



rp

ADM CC&C4

PLAINTIFF'S
EXHIBIT

948



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

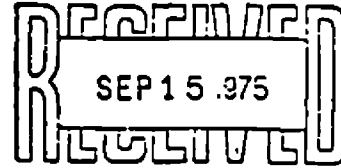
L. P. Voigt
Secretary

BOX 450
MADISON, WISCONSIN 53701

September 11, 1975

IN REPLY REFER TO: _____

Mr. Arthur T. Hart
Director of Field Services
National Agricultural Chemicals Assn.
1155 Fifteenth St., N.W.
Washington, D.C. 20005



BY _____

The Governors' Great Lakes Regional Interdisciplinary Pesticide Council has reviewed the issue of PCB contamination of waters and foods. The Wisconsin Departments of Natural Resources and Health & Social Services have participated in these discussions. In addition, both departments have participated in the Environmental Protection Agency Regional Conference and Wisconsin Department of Natural Resources public hearings concerning the use and discharge of PCBs. Both departments concluded that the use of PCBs should be eliminated or at least restricted on the basis of essential need and an ability to prevent environmental contamination. The two Wisconsin Departments therefore propose the attached resolution for consideration at the September 18, 1975 meeting of the Interdisciplinary Pesticide Council.

I would request that you offer a position for your agency at that time. Represented nonmember agencies may enter their position, which will be advisory. The position of the Council will of course only be advisory to the respective State Executives.

Sincerely,
Division of Environmental Standards


Lloyd A. Lueschow, Chief
Laboratory Services Section

LAL:pmm
Attach.

Bill Sarin
608-266-7135
Contact official
in that case.

ADM CC6584



THIS IS 100% RECYCLED PAPER

WHEREAS, the Lake Michigan Toxic Substance Committee of the EPA has reviewed the most recent toxicological and analytical data and has concluded that:

1. The effect level of PCBs in primates reproduction has been recently documented as less than 2.5 ppm and is much lower than has been observed in Standard test mammals (rats).
2. As a result of recent court decisions, the FDA is now enforcing the 5 ppm residue maximum in fish intended for human consumption and is likely to review the 5 ppm maximum allowable based on recent primate toxicological evidence.
3. The concentrations of PCBs in Lake Michigan fish are probably not decreasing and salmonids, particularly larger specimens, currently exceed the 5 ppm maximum allowable levels.
4. Reported efforts by the manufacturer to restrict distribution and efforts by the agencies to restrict discharges have not resulted in PCB reductions in the lake.
5. It is probable that wastewater sources of PCBs to Lake Michigan are ubiquitous, and at or below detectable levels.
6. An economic loss has already resulted to the commercial fishery as a result of PCB contamination. A much larger economic loss to the commercial and sport fishing industry is imminent in light of current FDA food recommendations and enforcement actions.
7. Non-Wastewater PCBs are still reaching the environment from incineration, land disposal and careless dumping.
8. The presence of PCBs in many processes and products continues to be widespread in spite of the Monsanto Chemical Company policy to restrict sale to closed systems.
9. Many uses of PCBs can be eliminated or replaced by using alternative chemicals, and

WHEREAS, both domestic and foreign PCB pose an environmental hazard, and

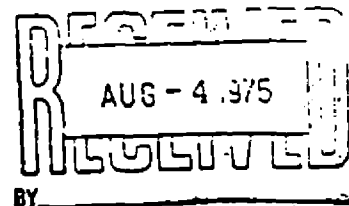
WHEREAS, current industry efforts to regulate PCBs have not proven effective in reducing environmental contamination, and

WHEREAS, recent analytical data establishes beyond reasonable doubt that PCBs are contaminating the environment as a result of nonessential uses, and

WHEREAS, virtually every use of PCB is replaceable by an alternative product or engineering design,

NOW THEREFORE BE IT RESOLVED THAT, member agencies represented in The Governors' Great Lakes Regional Interdisciplinary Pesticide Council seek Legislation or Administrative Rules to ban all uses of PCBs other than those uses considered essential after public hearing by appropriate legislative committee or regulatory agency.

ADM C08586



AGENDA

GOVERNORS' INTERDISCIPLINARY COMMITTEE ON PESTICIDES

SEPTEMBER 18, 1975

Camelot Inn
6565 N. Mannheim Road
Rosemount, Illinois

9:00 A.M. Business Meeting

- a. Review of Direction from Governors
- b. Status of Membership

9:15 A.M. Current Problems in Implementing Amended FIFRA

Dr. John Osmund
Purdue University

10:15 A.M. The Bird Pesticide Controversy Today

William Stickel
Patuxent Wildlife Research Center
Laurel, Maryland

11:15 A.M. Review of PCB Regulatory Efforts

John Hesse
Michigan Water Resources Commission

12:00 Noon Lunch

1:00 P.M. Implementation and Enforcement of Label Cautions
and Warnings

Bob Luss
US-EPA
Chicago, Ill.

Terrell Hunt
Pesticide Misuse Review Committee

ADM 008567

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SUBJECT: Emissions of PCB from the Incinerator at Monsanto - DATE: February 11, 1976
Sauget, Illinois.

FROM: R. Edwin Zylstra, Technical Advisor, Special Projects Section

TO: Chief, Air Surveillance Branch

On January 27-28, 1976 sampling was conducted at the Krummrich Plant of Monsanto in Sauget, Illinois to determine emissions to the air. The samples were taken near the exits of the steam jet ejectors of the non-fractionating distillation process. The exits of the fractionating distillation steam ejector were not sampled because of inaccessibility. The incinerator used to destroy waste PCB's was not sampled because Monsanto had tested the stack and the results were made available to us.

I have reviewed the test procedures and the data from three stack tests and I feel that the test results accurately indicate the quantity of PCB being emitted into the atmosphere from the incinerator. The Monsanto procedure for stack testing the incinerator for PCB and particulate is shown in Appendix A. The method is a modified EPA Method 5. The front half is identical to Method 5 and consists of a sample nozzle, a heated probe, and a heated glass fiber filter. The back half is as follows: 1. First impinger empty; 2. Second impinger with 150 ml. of N, N-dimethyl formamide; 3. Third impinger with 75 ml. NaOH solution and 75 ml. Na2SO3 solution; 4. Fourth impinger with 200 g silica gel. Sampling is performed the same as Method 5. To determine the PCB emissions the sample is handled as follow:

1. Probe, nozzle and filter are rinsed with hexane. The rinse is mixed with any condensate from the first impinger and then analyzed for PCB by means of electron capture gas chromatograph.
2. The NN dimethy formamide in the second impinger is analyzed for PCB by means of electron capture gas chromatograph.

The table shows the results of stack tests for PCB on the incinerator performed by Monsanto. Emission ranged from .00001 to .000248 lbs/hr. Computer printouts of data collected and the results of the last three tests performed were supplied to us for evaluation. The calculations were checked and no errors were found. Monsanto's and our computer printouts are in Appendix 8.



STACK TESTS ON MONSANTO PCB INCINERATOR

The following tests were made using a modification of Illinois Method 5 and both flow and concentrations were determined.

<u>Date</u>	<u>PCB concⁿ in ng/m³</u>	<u>Flow m³/min.</u>
7/25/73	0.0063	63.5
8/7/73	0.0157	94.8
8/16/73	0.0176	106.5
8/24/73	0.0166	106.8
10/26/73	0.0077	48.3
11/7/73	0.0056	58.1
11/20/73	0.0119	63.8
11/28/73	0.0013	66.7
8/23/74	0.0149	71.1
9/12/74	0.0289	51.1
5/23/75	0.0300	44.5
10/1/75	0.0182	92.2

APPENDIX A

MONSANTO PROCEDURE FOR STACK TESTING FOR PCBs

ADM CCEeCe

INCINERATOR STACK TEST FOR PCB'S AND PARTICULATES

SCOPE: This procedure determines the amount of PCB's and particulates present in the incinerator stack gas.

- EQUIPMENT:
1. R.A.C. portable stack gas sampler
 - a. sample box
 - b. unibilical cord 25 feet (2 each)
 - c. nozzles 0.250 or 0.375
 - d. clamps (10 each) 28/15 Fisher 5-885F
 - e. 3' combination probe and pitot tube (glass)
 - f. glass connectors (4 each)
 - g. 500 ml Greenburg-Smith impinger (4 each) Fisher Scientific Company, St. Louis, MO cat. no. 9-257, or equivalent. The fourth impinger is modified by replacing the standard tip with a 1/2 inch ID glass tube extending to one-half inch from bottom of impinger flask.
 2. Glass orifice to regulate air flow through pit tube. (2 each) Can be made from broken thermome
 3. Thermometer 0-220°F
 4. Thermocouple and potentiometer
 5. Nomograph
 6. Clip board
 7. Air Pump (Dyna pump)
 8. Stopwatch (2 each)
 9. Tape ruler
 10. 3 way plug
 11. Stopcock grease
 12. 50 ft. of 5/8" rope.
 13. Adjustable wrenches (2 each)

FOR PARTICULATE TEST ADD:

1. Cyalone and Erlenmeyer flask
2. Clamps 2 each 28/15

3. Glass fiber filter holder.

4. Glass fiber size 7.0 CM (Fisher cat. no. 9-873)
Dry in oven and leave in desiccator.

REAGENTS:

- a. Sodium Sulfite, Fisher Scientific Company, St. Louis, Miss; Cat. No. S-430 in unstandardized solution. Weight 63 gram dissolve in water and make up to 1 liter.
- b. N,N-Dimethyl Formamide, Fisher Scientific CO., St. Louis, Missouri, Cat. No. D-119.
- c. Sodium Hydroxide 50% solution, Fisher Scientific Company, St. Louis, Missouri, Cat. No. SO-S-254, in unstandardized solution. Add 52.4 ml to 500 ml distilled water and make to a liter.
- d. Hexane; nonograde (Mallinckrodt Chemical Works, St. Louis, Missouri, Cat. No. 4159)
- e. Silica Gel Grade 938 Darison Code 938-08-08-226 Davison Chemical; Baltimore, Maryland, 21203.
- f. Crushed ice.

SAMPLING PROCEDURE:

1. Measure stack diameter and determine minimum number of sampling points needed.
2. Measure stack temperature
3. Determine percent moisture. This may be found from previous tests.
4. Place sample box on duorail and assemble impingers. Leaving the first impinger empty. Fill the second impinger with 150 ml of DMF solution. Add 75 ml in NaOH plus 75 ml in Na_2SO_3 in the third impinger. The last impinger will contain 200 g silica gel in a modified impinger. (Weigh silica gel for water determination later).
5. Place the cyclone and glass fiber filter in the heat chamber and connect to impingers.
6. Connect vacuum line of umbilical cord to inlet of meter box and outlet of last impinger. Plug up the inlet to the filter holder and pull 15 in. Hg vacuum to check for leaks. Leakage rate should not exceed 0.02 C.F.M.
7. Connect glass probe to cyclone.
8. Complete all connections on umbilical cord.
9. Purge air through pitot tube using tubing which is attached to umbilical cord and connect to air pump.
10. Pack ice around impinger and add water.
11. Make a traverse of stack on one side to determine velocity and stack pressure. Be sure you have balanced draft gage before you take your readings.
12. Heat probe and chamber in box to a temperature of 10° higher than the stack temperature.
13. Record temperature at gas meter. (inlet and outlet.)
14. Use Nomograph to determine nozzle size and isokinetic sampling rate.
15. Record gas meter readings.
16. As soon as heat chamber in sampling box is up to temperature start your test.

SAMPLE TRAIN OPERATION

1. For each run, record the data required on the example sheet shown in Figure 1-2.
2. Determine the time required at each sampling point. A minimum time of one hour is required for this test.
3. To begin sampling, position the nozzle at the first traverse point with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Sample for at least 5 minutes at each traverse point; sampling time must be the same for each point.
4. Record temperature at gas meter inlet and outlet, about one minute before it is time to change traverse points. Also be sure to read temperature of last impinger.
5. Add more ice during test to keep the temperature of gases leaving the last impinger as low as possible and preferably at 70° F or less.
6. Turn off pumps at the conclusion of sample run and record final reading.
7. Remove probe from stack and disconnect from impingers. Take probe and impingers and prepare them for lab analysis.
8. Measure the increase in volume of each impinger plus the increase in weight of the silica gel to determine percent wa
9. Rinse probe and cyclone with hexane and pass rinsing through glass fiber filter. Mix this extract with the water (condensate from the first impinger).
10. Carefully remove the filter pad plus rubber washer and dry in oven then place in desiccator before weighing for particulate
11. Collect all washings and give to lab for analysis.
12. Upon receipt of analysis from lab, record results in grams on sheet shown in Figure 1-1 and complete for computer run.

DISCUSSION:

ADM C08613

The collection system in this test may also be used to determine other components of the stack gas. The ones of most interest would be HCl, H₃PO₄, and Cl₂. To do this have the lab save all aqueous layers from washing used in preparing the solutions for PCB analysis. Take the aqueous layer from the first impinger (water condensate) and run for HCl and H₃PO₄ analysis. Analyze the dimethyl formamide from the second impinger for Cl₂ and H₃PO₄ and the Na₂SO₃ impinger for Cl₂.

1-12-13	14-15	16-17	18-19	20-21	22-23	24-25	26-27	28-29	30-31	32-33	34-35	36-37	38-39	40-41	42-43	44-45	46-47	48-49	50-51	52-53	54-55	56-57	58-59	60-61	62-63	64-65	66-67	68-69	70-71	72-73	74-75	76-77	78-79	80-81	82-83	84-85	86-87	88-89	90-91	92-93	94-95	96-97	98-99	100-101	102-103	104-105	106-107	108-109	110-111	112-113	114-115	116-117	118-119	120-121	122-123	124-125	126-127	128-129	130-131	132-133	134-135	136-137	138-139	140-141	142-143	144-145	146-147	148-149	150-151	152-153	154-155	156-157	158-159	160-161	162-163	164-165	166-167	168-169	170-171	172-173	174-175	176-177	178-179	180-181	182-183	184-185	186-187	188-189	190-191	192-193	194-195	196-197	198-199	200-201	202-203	204-205	206-207	208-209	210-211	212-213	214-215	216-217	218-219	220-221	222-223	224-225	226-227	228-229	230-231	232-233	234-235	236-237	238-239	240-241	242-243	244-245	246-247	248-249	250-251	252-253	254-255	256-257	258-259	260-261	262-263	264-265	266-267	268-269	270-271	272-273	274-275	276-277	278-279	280-281	282-283	284-285	286-287	288-289	290-291	292-293	294-295	296-297	298-299	300-301	302-303	304-305	306-307	308-309	310-311	312-313	314-315	316-317	318-319	320-321	322-323	324-325	326-327	328-329	330-331	332-333	334-335	336-337	338-339	340-341	342-343	344-345	346-347	348-349	350-351	352-353	354-355	356-357	358-359	360-361	362-363	364-365	366-367	368-369	370-371	372-373	374-375	376-377	378-379	380-381	382-383	384-385	386-387	388-389	390-391	392-393	394-395	396-397	398-399	400-401	402-403	404-405	406-407	408-409	410-411	412-413	414-415	416-417	418-419	420-421	422-423	424-425	426-427	428-429	430-431	432-433	434-435	436-437	438-439	440-441	442-443	444-445	446-447	448-449	450-451	452-453	454-455	456-457	458-459	460-461	462-463	464-465	466-467	468-469	470-471	472-473	474-475	476-477	478-479	480-481	482-483	484-485	486-487	488-489	490-491	492-493	494-495	496-497	498-499	500-501	502-503	504-505	506-507	508-509	510-511	512-513	514-515	516-517	518-519	520-521	522-523	524-525	526-527	528-529	530-531	532-533	534-535	536-537	538-539	540-541	542-543	544-545	546-547	548-549	550-551	552-553	554-555	556-557	558-559	560-561	562-563	564-565	566-567	568-569	570-571	572-573	574-575	576-577	578-579	580-581	582-583	584-585	586-587	588-589	590-591	592-593	594-595	596-597	598-599	600-601	602-603	604-605	606-607	608-609	610-611	612-613	614-615	616-617	618-619	620-621	622-623	624-625	626-627	628-629	630-631	632-633	634-635	636-637	638-639	640-641	642-643	644-645	646-647	648-649	650-651	652-653</
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APPENDIX B

STACK TEST COMPUTER PRINTOUTS

ADM CCEc1c

MONSANTO INDUSTRIAL CHEMICALS CO.

W.G. KRUMMRICH PLANT SAUGET, IL 62201. ID NO. 63 121 AAC
 DATE SEPT 12 1974 START TIME 1:00 PM
 STACK SAMPLED- INCINERATOR SOURCE OPERATION NO. 831
 SAMPLING DONE BY NEIL SULLIVAN AND ED MEUMANN

SAMPLING METHOD-EPA METHOD #5 + DMF AND NA2SO3 IMPINGERS

DETERMINATION OF EMISSION RATE OF

A: PARTICULATE
 B: P.C.B.
 C: HCL
 D: H3PO4

PROCESS WEIGHT RATE= 772.00 POUNDS PER HOUR

TEST RESULT:

	ACTUAL CFM AT STACK CONDITIONS	STD CFM AT 70 DEG.F AND 29.92 IN. HG	DRY STD CFM
STACK VOLUME	1903.1	1803.8	1711.6

DUST, MIST, OR GAS CONCENTRATION IN WET & DRY STACK GAS AT STD CONDIT

COMPONENT	GRAINS PER CUBIC FT	LBS. PER MILLION CUBIC FT	LBS. PER 1000 LBS. GAS	MGS. PER CUBIC METER	PARTS PER MILLION
A:	0.0708	10.1163	0.1331	162.0446	134.9248 IN WET
A:	0.0746	10.6611	0.1374	170.7756	142.1910 IN DRY
B:	0.0000	0.0018	0.0000	0.0289	0.0028 IN WET
B:	0.0000	0.0019	0.0000	0.0304	0.0029 IN DRY
C:	0.0307	4.3816	0.0576	70.1866	46.4308 IN WET
C:	0.0323	4.6176	0.0595	73.9665	48.9313 IN DRY
D:	0.0827	11.8131	0.1554	189.2287	46.6235 IN WET
D:	0.0871	12.4493	0.1604	199.4194	49.1344 IN DRY

EMISSION RATE:

COMPONENT	LBS. PER HOUR	GRAMS PER SEC.	LBS. PER UNIT OF PRODUCTION
A:	1.0948	0.1379	0.0014
B:	0.0002	0.0000	0.0000
C:	0.4742	0.0597	0.0006
D:	1.2785	0.1611	0.0017

MONSANTO INDUSTRIAL CHEMICALS CO.

W.G. KRUMRICH PLANT SAUGET, IL 62201. ID NO. 63 121 AAC
 DATE SEPT 12 1974 START TIME 1:00 PM
 STACK SAMPLED- INCINERATOR SOURCE OPERATION NO. 8:

FIELD DATA:

ORIFICE CONSTANT K=0.506 PITOT TUBE FACTOR FS= 0.83
 TEMPS. RECORDED IN FA DEGREES
 METER CORRECTION FACTOR= 1.02

GAS ANALYSIS: Z=NONE MOLECULAR WT OF Z= 0.0
 MOLECULAR WT. OF STACK GAS = 29.40
 DRY MOLECULAR WT. OF GAS = 30.02

O2	N2	CO2	CO	H2O	Z	VOL	TW	PW
0.106	0.802	0.092	0.0	0.051	0.0	40.630	100.20	29.64

PARTICULATE	DETERMINED BY	BY WEIGHT	=	GRAM
P.C.8.	DETERMINED BY	BY WEIGHT	=	0.0000 GRAM
HCL	DETERMINED BY	BY WEIGHT	=	0.0816 GRAM
H3PO4	DETERMINED BY	BY WEIGHT	=	0.2200 GRAM

LEAK TEST ON EQUIPMENT=0.001 CFM AT 15.00 IN.HG
 BAROMETER= 29.64 IN.HG; STACK DIAM= 19.000 IN.; NOZZLE DIAM = 3.

ZONE	VEL HEAD HP	STACK TEMP TS	STACK PRESS H2O	TIME ATEND ZONE	VOLAT END ZONE	COND TEMP	METER IN	TEMP OUT	METER START HG	PRESS FIN HG	FL OR F
0	0.0	95.0	0.8	0.0	935.30	D	90.0	90.0	0.0	0.0	0
1	0.060	95.0	0.8	8.0	939.71	64.0	98.0	90.0	0.0	0.0	1
2	0.080	95.0	0.8	16.0	944.74	64.0	106.0	91.0	0.0	0.0	1
3	0.095	95.0	0.8	24.0	950.22	65.0	111.0	92.0	0.0	0.0	1
4	0.095	95.0	0.8	32.0	955.71	65.0	111.0	94.0	0.0	0.0	1
5	0.065	95.0	0.8	40.0	960.50	63.0	106.0	95.0	0.0	0.0	1
6	0.080	95.0	0.8	48.0	965.28	64.0	110.0	98.0	0.0	0.0	1
7	0.090	95.0	0.8	56.0	970.65	65.0	113.0	97.0	0.0	0.0	1
8	0.090	95.0	0.8	62.0	975.93	68.0	114.0	97.0	0.0	0.0	1

ACM CC8618

MONSANTO INDUSTRIAL CHEMICALS CO.

W.G. KRUMMRICH PLANT SAUGET, IL 62201. ID NO. 63 121 AAC
 DATE OCT 1 1975 START TIME 1:30 PM
 STACK SAMPLED- INCINERATOR SOURCE OPERATION NO. 831
 SAMPLING DONE BY NEIL SULLIVAN AND ED HEUMANN

SAMPLING METHOD-EPA METHOD #5 + DMF AND NA2SO3 IMPINGERS

DETERMINATION OF EMISSION RATE OF

A: PARTICULATE

B: P.C.B.

C: CL2

PROCESS WEIGHT RATE= 0.90 THOUSAND POUNDS PER HOUR

TEST RESULT:

/ACTUAL CFM AT /STD CFM DRY STD CFM /
 /STACK CONDITIONS/ AT 70 DEG.F AND 29.92 IN. HG/
 STACK VOLUME 3749.6 3257.1 2353.4

DUST, MIST, OR GAS CONCENTRATION IN WET & DRY STACK GAS AT STD. CONDITIONS

COMPONENT	GRAINS PER CUBIC FT	LBS. PER MILLION CUBIC FT	LBS. PER 1000 LBS. GAS	MGS. PER CUBIC METER	PARTS PER MILLION	
A:	0.0725	10.3620	0.1494	165.9635	138.2010	IN WET GAS
A:	0.1004	14.3408	0.1836	224.7183	191.2679	IN DRY GAS
B:	0.0000	0.0011	0.0000	0.0182	0.0018	IN WET GAS
B:	0.0000	0.0016	0.0000	0.0252	0.0024	IN DRY GAS
C:	0.0079	1.1335	0.0163	18.1570	6.1749	IN WET GAS
C:	0.0110	1.5687	0.0201	25.1290	8.5460	IN DRY GAS

EMISSION RATE:

COMPONENT	LBS. PER HOUR	GRAMS PER SEC.	LBS. PER UNIT OF PRODUCTION
A:	2.0250	0.2551	2.2450
B:	0.0002	0.0000	0.0002
C:	0.2215	0.0279	0.2456

ACM CCE62C

DATE OCT 1 1975 START TIME 1:30 PM
 STACK SAMPLED- INCINERATOR... SOURCE OPERATION NO. 6

FIELD DATA:

ORIFICE CONSTANT K=0.506 PITOT TUBE FACTOR FS= 0.83
 TEMPS. RECORDED IN FA DEGREES
 METER CORRECTION FACTOR= 1.02

GAS ANALYSIS: Z=NONE MOLECULAR WT. OF Z= 0.0
 MOLECULAR WT. OF STACK GAS = 26.83
 DRY MOLECULAR WT. OF GAS = 30.22

O2	N2	CO2	CO	H2O	Z	VOL	TW	PW
0.068	0.818	0.114	0.0	0.277	0.0	30.200	70.89	29.902

PARTICULATE DETERMINED BY BY WEIGHT *GC* = 0.2002 GRAMS
 P.C.B. DETERMINED BY BY ~~TITRATION~~ = 0.0000 GRAMS
 CL2 DETERMINED BY BY TITRATION = 0.0219 GRAMS

LEAK TEST ON EQUIPMENT=0.005 CFM AT 15.00 IN.HG
 BAROMETER= 29.90 IN.HG; STACK DIAM= 19.000 IN.; NOZZLE DIAM = 0.0

ZONE	VEL HEAD HP	STACK TEMP TS	STACK PRESS H2O	STACK TIME ATEND	COND VOLAT END	COND TEMP	METER IN	METER OUT	METER PRESS START HG	METER PRESS FIN HG	FLC ORI HE
0	0.0	149.0	-0.4	0.0	428.50	0	64.0	64.0	0.0	0.0	0.0
1	0.200	149.0	-0.4	8.0	431.84	51.0	68.0	64.0	0.0	0.0	0.0
2	0.300	149.0	-0.4	16.0	435.82	51.0	74.0	64.0	0.0	0.0	0.0
3	0.340	149.0	-0.4	24.0	439.97	53.0	80.0	65.0	0.0	0.0	1.0
4	0.330	149.0	-0.4	32.0	444.11	55.0	80.0	66.0	0.0	0.0	1.0
5	0.170	149.0	-0.4	40.0	447.29	53.0	74.0	66.0	0.0	0.0	0.0
6	0.230	149.0	-0.4	48.0	450.84	54.0	80.0	66.0	0.0	0.0	0.0
7	0.300	149.0	-0.4	56.0	454.84	56.0	83.0	68.0	0.0	0.0	0.0
8	0.270	149.0	-0.4	64.0	458.70	58.0	82.0	68.0	0.0	0.0	0.0

DATE OCT 1 1975 START TIME 1:30 PM
 STACK SAMPLED- INCINERATOR SOURCE OPERATION NO. 8
 CALCULATION AND EVALUATION:
 THE ISOKINETIC CONSTANT NO/HP FOR THIS EQUIPMENT IS 13.0114
 THE TABLE BELOW SHOWS, FOR EACH ZONE, THE METER VOL. AND THE AVG. ME
 AND PRESS. IN ABSOLUTE UNITS. FROM THIS IS CALCULATED THE EQUIVALE
 STACK CONDITIONS AND DIVIDED BY TIME TO GIVE THE FLOW IN THE NOZZL.
 COMPARED WITH THE ISOKINETIC FLOW RATE CALCULATED FROM THE STACK VI
 PERCENTAGE DEVIATION IS RECORDED.

ZONE	TIME	VEL.	METER	STACK	METER	STACK	METER	STACK	ACTUAL	ISOKIN	
1	8.0	27.6	29.9	29.9	525.0	609.0	3.3	5.5	0.69	1.27-46	
2	8.0	33.8	30.0	29.9	527.5	609.0	4.0	6.5	0.81	1.56-47	
3	8.0	36.0	30.0	29.9	530.8	609.0	4.2	6.7	0.84	1.66-49	
4	8.0	35.5	30.0	29.9	532.8	609.0	4.1	6.7	0.84	1.63-48	
5	8.0	25.5	29.9	29.9	531.5	609.0	3.2	5.2	0.64	1.17-45	
6	8.0	29.6	30.0	29.9	531.5	609.0	3.6	5.8	0.72	1.36-47	
7	8.0	33.8	30.0	29.9	534.3	609.0	4.0	6.5	0.81	1.56-48	
8	8.0	32.1	30.0	29.9	535.3	609.0	3.9	6.2	0.78	1.48-47	
TOTAL		64.0	31.7	30.0	29.9	531.1	609.0	30.2	49.0	0.77	1.46-47

T	AV	AV	AV	AV	AV	T	T	AV	AV
TOTAL SAMPLE VOL. CORRECTED FROM STACK CONDITIONS TO STD CONDITIONS:									
42.59 CUBIC FT. OF WET GAS									
TOTAL SAMPLE VOL. CORRECTED TO DRY STD CONDITIONS = 30.78 CUBIC									

MONSANTO INDUSTRIAL CHEMICALS CO.

W.G. WILSON PLANT SAUGET, IL 62201. ID NO. 63 121 AAC

DATE MAY 23 1975 START TIME 10:30 AM

STACK SAMPLES INCINERATOR STACK

SOURCE OPERATION NO. 831

SAMPLING DONE BY NEIL SULLIVAN AND ED H

SAMPLING METHOD-EPH METHOD #5 & UMF AND NA2SO3 IMPINGERS

DETERMINATION OF EMISSION RATE OF

A: PARTICULATE

B: P.C.B.

C: HCL

D: CL2

PROCESS WEIGHT RATE= 1.00 THOUSAND POUNDS PER HOUR

TEST RESULT:

	/ACTUAL CFM AT / STACK CONDITIONS/	/STD CFM AT 70 DEG.F AND 29.92 IN. HG/	DRY STD CFM
STACK VOLUME	1711.6	1649.0	1569.5

DUST, MIST, OR GAS CONCENTRATION IN WET & DRY STACK GAS AT STD CONDITIO

COMPONENT	GRAINS PER CUBIC FT	LBS. PER MILLION CUBIC FT	LBS. PER 1000 LBS. GAS	MGS. PER CUBIC METER	PARTS PER MILLION	
A:	0.0522	7.4602	0.0962	119.5008	99.4986	IN WET GAS
A:	0.0549	7.8343	0.0991	125.5580	104.5420	IN DRY GAS
B:	0.0000	0.0016	0.0000	0.0257	0.0025	IN WET GAS
B:	0.0000	0.0017	0.0000	0.0270	0.0026	IN DRY GAS
C:	0.0027	0.3787	0.0049	6.0656	4.0126	IN WET GAS
C:	0.0028	0.3979	0.0050	6.3731	4.2160	IN DRY GAS
D:	0.0021	0.2970	0.0038	4.7580	1.6181	IN WET GAS
D:	0.0022	0.3121	0.0039	4.9991	1.7001	IN DRY GAS

EMISSION RATE:

COMPONENT	LBS. PER HOUR	GRAMS PER SEC.	LBS. PER UNIT OF PRODUCTION
A:	0.7381	0.0930	0.7381
B:	0.0002	0.0000	0.0002
C:	0.0375	0.0047	0.0375
D:	0.0294	0.0037	0.0294

ADM GC8623

W.G. KRUMMRICH PLANT SAUGET, IL 62201. IO NO. 63 121 AAC
 DATE MAY 23 1975 START TIME 10:30 AM
 STACK SAMPLED- INCINERATOR STACK SOURCE OPERATION NO. 831

FIELD DATA:

ORIFICE CONSTANT K=0.506 PITOT TUBE FACTOR FS= 0.83
 TEMPS. RECORDED IN FA DEGREES
 METER CORRECTION FACTOR= 1.02

GAS ANALYSIS: Z=NONE MOLECULAR WT OF Z= 0.0
 MOLECULAR WT. OF STACK GAS = 30.00
 DRY MOLECULAR WT. OF GAS = 30.60

O2	N2	CO2	CO	H2O	Z	VDL	TW	PW	WC
0.028	0.824	0.148	0.0	0.048	0.0	45.630	114.40	29.64	44.0

PARTICULATE	DETERMINED BY	KY WEIGHT	GRAMS
P.C.B.	DETERMINED BY	KY WEIGHT	0.0000
HCL	DETERMINED BY	KY WEIGHT	0.0077
CL2	DETERMINED BY	KY WEIGHT	0.0060

LEAK TEST ON EQUIPMENT=0.004 CFM AT 15.00 IN.HG
 BAROMETER= 29.64 IN.HG; STACK DIAM= 19.000 IN.; NOZZLE DIAM = 0.375

ZONE	VEL HEAD	STACK TEMP	STACK PRESS	TIME ATEND	VOLAT END	COND TEMP	METER IN	METER OUT	METER TEMP	METER PRESS	FLOWME
	IP	TS	H2O	ZONE	ZONE					START FIN	ORIFIC
										HG HG	H2O
0	0.0	86.0	0.8	0.0	926.60	D	86.0	86.0	0.0	0.0	0.0
1	0.080	86.0	0.8	8.0	932.60	0.0	106.0	94.0	0.0	0.0	1.920
2	0.090	86.0	0.8	16.0	938.71	0.0	122.0	104.0	0.0	0.0	2.160
3	0.060	86.0	0.8	24.0	944.48	0.0	132.0	104.0	0.0	0.0	1.450
4	0.060	86.0	0.8	32.0	950.04	0.0	134.0	108.0	0.0	0.0	1.450
5	0.050	86.0	0.8	40.0	955.74	0.0	128.0	110.0	0.0	0.0	1.200
6	0.070	86.0	0.8	48.0	960.50	0.0	134.0	112.0	0.0	0.0	1.700
7	0.070	86.0	0.8	56.0	967.85	0.0	134.0	114.0	0.0	0.0	1.700
8	0.070	86.0	0.8	64.0	972.23	0.0	134.0	118.0	0.0	0.0	1.700

MONSANTO INDUSTRIAL CHEMICALS CO.

W.G. KRUMMRICH PLANT SAUGET, IL 62201. ID NO. 63 121 AAC

DATE MAY 23, 1975 START TIME 10:30 AM

STACK SAMPLED- INCINERATOR STACK

SOURCE OPERATION NO. 831

CALCULATION AND EVALUATION:

THE ISO KINETIC CONSTANT HO/HP FOR THIS EQUIPMENT IS 24.7938

THE TABLE BELOW SHOWS, FOR EACH ZONE, THE METER VOL. AND THE AVG. METER AND PRESS. IN ABSOLUTE UNITS. FROM THIS IS CALCULATED THE EQUIVALENT V STACK CONDITIONS AND DIVIDED BY TIME TO GIVE THE FLOW IN THE NOZZLE. T. COMPARED WITH THE ISO KINETIC FLOW RATE CALCULATED FROM THE STACK VELOC PERCENTAGE DEVIATION IS RECORDED.

ZONE	SAMPLE TIME	STACK VEL.	AVG. METER PRESS	AVG. METER STACK	TEMP/ SAMPLE VOL.	AVG. METER STACK	SAMPLE RATE	ACTUAL	ISO KIN	DEV
1	8.0	15.7	29.8	29.7	553.0	546.0	6.0	6.4	0.80	0.72 10.23
2	8.0	16.6	29.8	29.7	546.5	546.0	6.1	6.3	0.79	0.77 3.38
3	8.0	13.6	29.7	29.7	575.5	546.0	5.8	5.9	0.73	0.63 17.49
4	8.0	13.6	29.7	29.7	579.5	546.0	5.6	5.6	0.70	0.63 12.42
5	8.0	12.4	29.7	29.7	580.0	546.0	5.7	5.8	0.72	0.57 26.08
6	8.0	14.7	29.8	29.7	581.0	546.0	4.8	4.8	0.60	0.68 11.06
7	8.0	14.7	29.8	29.7	583.5	546.0	7.3	7.4	0.92	0.68 36.74
8	8.0	14.7	29.8	29.7	585.0	546.0	4.4	4.4	0.55	0.68 18.72
TOTAL	64.0	14.5	29.8	29.7	575.5	546.0	45.6	46.5	0.73	0.67 9.04
	T	AV	AV	AV	AV	AV	T	T	AV	AV

TOTAL SAMPLE VOL. CORRECTED FROM STACK CONDITIONS TO STD CONDITIONS=

44.83 CUBIC FT. OF WET GAS

TOTAL SAMPLE VOL. CORRECTED TO DRY STD CONDITIONS = 42.67 CUBIC FT.

U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 7
AIR QUALITY MONITORING DIVISION FIELD SUPPORT SECTION
STACK TEST REPORT

COMPANY WABASH

STACK IDENTIFICATION NO. 1000000000

RUN NUMBER DATE OF RUN Sept. 2, 1976

1. Amount of water collected (milliliters) = 43.3
Volume of water vapor collected (STP) = 2.05525
2. Dry gas meter volume at meter conditions (cubic feet) = 40.73
Barometric pressure (inches of mercury) = 29.64
Average orifice pressure drop (inches of water) = 1.600
Average meter temperature = 100 °F
3. Gas meter volume at STP (dry cubic feet) = 33.22
4. Percentage of moisture in gas stream = 5.1% Z
5. Percent composition of gas stream:
Oxygen..... 10.60% Z
Nitrogen..... 80.20%
Carbon Dioxide... 9.20%
Carbon Monoxide.. .00% Z
6. Percentage of excess air = 100.25Z
7. Dry molecular weight of gas stream (lb./lb-mole) = 29.80
Wet molecular weight of gas stream (lb./lb-mole) = 29.28
8. Pitot tube coefficient (dimensionless) = .83
Number of pitot tube readings = 8
Average of square roots of velocity pressures = .2852
Average gas stream temperature (°F) = 95°F
Gas stream velocity (ft/sec) = 16.165
Pitot tube readings:

.06	.03	.09	.09	.06	.03	.09
.09						
9. Stack dimensions, circular with diameter (feet) = 1.53
Stack area (square feet) = 1.96
Volumetric flow at STP (cubic feet/min) = 1710
10. Nozzle diameter used for sampling (inches) = .375
Sampling time (minutes) = 62.00
Weight of particulate matter collected (milligrams) = .03
11. Particulate concentration (lb./SCF) = .0000000
Particulate concentration (grain/SCF) = .000013
Particulate concentration corrected to 50 % excess air (lb./CF) = .0000000
Particulate concentration corrected to 50 % excess air (grain/CF) = .0000
12. Isokinetic rate (%) = 92.15
13. Mass emission rate (lb./hr) = .00

Date Feb. 10, 1976

Signature R. Edwin Z. Lira

U.S. ENVIRONMENTAL PROTECTION AGENCY REGION V
AIR SURVEILLANCE STATION FIELD SUPPORT SECTION
STACK TEST REPORT

CITY CHICAGO

STACK IDENTIFICATION NOT IDENTIFIED

TEST NUMBER 11 DATE OF TEST July 22, 1976

1. Amount of water collected (milliliters) = 44.70
Volume of water vapor collected (STP) = 2.11673
2. Dry gas meter volume at meter conditions (cubic feet) = 45.63
Barometric pressure (inches of mercury) = 29.64
Average orifice pressure drop (inches of water) = 1.660
Average meter temperature = 114 °F
3. Gas meter volume at STP (dry cubic feet) = 41.67
4. Percentage of moisture in gas stream = 4.81 %
5. Percent composition of gas stream:
Oxygen..... 2.80%
Nitrogen..... 82.40%
Carbon Dioxide... 14.80%
Carbon Monoxide... .00%
6. Percentage of excess air = 14.77%
7. Dry molecular weight of gas stream (lb./lb-mole) = 30.48
Wet molecular weight of gas stream (lb./lb-mole) = 29.57
8. Pitot tube coefficient (dimensionless) = .83
Number of pitot tube readings = 8
Average of square roots of velocity pressures = .2612
Average gas stream temperature (°F) = 86°F
Gas stream velocity (ft/sec) = 14.537
Pitot tube readings:

.05	.09	.06	.06	.05	.07	.07
.07						
9. Stack dimensions, circular with diameter (feet) = 1.53
Stack area (square feet) = 1.96
Volumetric flow at STP (cubic feet/min) = 1568
10. Nozzle diameter used for sampling (inches) = .375
Sampling time (minutes) = 64.07
Weight of particulate matter collected (milligram) = .03
11. Particulate concentration (lb./SCF) = .000000
Particulate concentration (grain/SCF) = .000012
Particulate concentration corrected to 5% excess air (lb./CF) = .000000
Particulate concentration corrected to 5% excess air (grain/CF) = .000007
12. Isokinetic ratio (%) = 106.64
13. Mass emission rate (lb./hr) = .00

Date Feb. 10, 1976

Signature R. E. Ziegler

ADM CCR627

STACK IDENTIFICATION PCM Incinerator

TEST NUMBER

DATE OF RUN Oct. 1, 1975

1. Amount of water collected (milliliters) = 244.61
Volume of water vapor collected (STP) = 11.59451
2. Dry gas meter volume at meter conditions (cubic feet) = 37.20
Barometric pressure (inches of mercury) = 29.90
Average orifice pressure drop (inches of water) = .860
Average meter temperature = 71 °F
3. Gas meter volume at STP (dry cubic feet) = 30.13
4. Percentage of moisture in gas stream = 27.75 %
5. Percent composition of gas stream:
Oxygen..... 6.87%
Nitrogen..... 81.80%
Carbon Dioxide... 11.40%
Carbon Monoxide.. .00%

6. Percentage of excess air = 45.96%
7. Dry molecular weight of gas stream (lb./lb-mole) = 30.00
Wet molecular weight of gas stream (lb./lb-mole) = 26.73
8. Pitot tube coefficient (dimensionless) = .53
Number of pitot tube readings = 8
Average of square roots of velocity pressures = .5130
Average gas stream temperature (°F) = 147°F
Gas stream velocity (ft/sec) = 31.025
Pitot tube readings:

.20	.30	.34	.33	.17	.23	.30
.27						
9. Stack dimensions, circular with diameter (feet) = 1.50
Stack area (square feet) = 1.96
Volumetric flow at STP (cubic feet/min) = 2352
10. Nozzle diameter used for sampling (inches) = .375
Sampling time (minutes) = 64.00
Weight of particulate matter collected (milligram) = .02
11. Particulate concentration (lb./SCF) = .000000
Particulate concentration (grain/SCF) = .000011
Particulate concentration corrected to 50 % excess air (lb./CF) = .00000
Particulate concentration corrected to 50 % excess air (grain/CF) = .00
12. Isokinetic rate (%) = 51.23
13. Mass emission rate (lb./hr) = .00

ADM CC8628

Date Feb. 6, 1976

Signature [Signature]

MONSANTO INDUSTRIAL CHEMICALS CO.

W.G. KRUHMRICH PLANT SAUGET, IL 62201. ID NO. 63 121 AAC.

DATE MAY 23 1975 START TIME 10:30 AM

STACK SAMPLED- INCINERATOR STACK

SOURCE OPERATION NO. 831

CALCULATION AND EVALUATION:

THE ISOKINETIC CONSTANT HO/HP FOR THIS EQUIPMENT IS 24.7938

THE TABLE BELOW SHOWS, FOR EACH ZONE, THE METER VOL. AND THE AVG. METER T AND PRESS. IN ABSOLUTE UNITS. FROM THIS IS CALCULATED THE EQUIVALENT VOLUME AT STACK CONDITIONS AND DIVIDED BY TIME TO GIVE THE FLOW IN THE NOZZLE. THIS IS COMPARED WITH THE ISOKINETIC FLOW RATE CALCULATED FROM THE STACK VELOCITY. PERCENTAGE DEVIATION IS RECORDED.

SAMPLE/STACK/AVG.		PRESS/		AVG.		TEMP/SAMPLE		VOL./SAMPLE		RATE		/P.C.
ZONE	TIME	VEL.	METER	STACK	METER	STACK	METER	STACK	ACTUAL	ISOKIN	DEV	
1	8.0	15.7	29.8	29.7	553.0	546.0	6.0	6.4	0.80	0.72	10.23	
2	8.0	16.6	29.8	29.7	566.5	546.0	6.1	6.3	0.79	0.77	3.38	
3	8.0	13.6	29.7	29.7	575.5	546.0	5.8	5.9	0.73	0.63	17.49	
4	8.0	13.6	29.7	29.7	579.5	546.0	5.6	5.6	0.70	0.63	12.42	
5	8.0	12.4	29.7	29.7	580.0	546.0	5.7	5.8	0.72	0.57	26.08	
6	8.0	14.7	29.8	29.7	581.0	546.0	4.8	4.8	0.60	0.68	11.06	
7	8.0	14.7	29.8	29.7	583.5	546.0	7.3	7.4	0.92	0.68	36.74	
8	8.0	14.7	29.8	29.7	585.0	546.0	4.4	4.4	0.55	0.68	18.72	
TOTAL												
64.0		14.5	29.8	29.7	575.5	546.0	45.6	46.5	0.73	0.67	9.04	

T AV AV AV AV AV T T AV AV AV

TOTAL SAMPLE VOL. CORRECTED FROM STACK CONDITIONS TO STD CONDITIONS = 44.83 CUBIC FT. OF WET GAS

TOTAL SAMPLE VOL. CORRECTED TO DRY STD CONDITIONS = 42.67 CUBIC FT.

MONSANTO INDUSTRIAL CHEMICALS CO.

W.G. KRUMMRICH PLANT SAUGET, IL 62201. ID NO. 63 121 AAC
 DATE OCT 1 1975 START TIME 1:30 PM
 STACK SAMPLED- INCINERATOR SOURCE OPERATION NO. 831
 SAMPLING DONE BY NEIL SULLIVAN AND ED HEUMANN

SAMPLING METHOD-EPA METHOD #5 + DMF AND NA2SO3 IMPINGERS

DETERMINATION OF EMISSION RATE OF

A: PARTICULATE
 B: P.C.B.
 C: CL2

PROCESS WEIGHT RATE= 0.90 THOUSAND POUNDS PER HOUR

TEST RESULT:

	/ACTUAL CFM AT STACK CONDITIONS/	/STD CFM AT 70 DEG.F AND 29.92 IN. HG/	DRY STD CFM
STACK VOLUME	3749.6	3257.1	2353.4

DUST, MIST, OR GAS CONCENTRATION IN WET & DRY STACK GAS AT STD CONDITIONS

COMPONENT	GRAINS PER CUBIC FT	LBS. PER MILLION CURIC FT	LBS. PER 1000 LBS. GAS	MGS. PER CUBIC METER	PARTS PER MILLION	
A:	0.0725	10.3620	0.1494	165.9835	138.2010	IN WET GAS
A:	0.1004	14.3408	0.1836	229.7183	191.2679	IN DRY GAS
B:	0.0000	0.0011	0.0000	0.0182	0.0018	IN WET GAS
B:	0.0000	0.0016	0.0000	0.0252	0.0024	IN DRY GAS
C:	0.0079	1.1335	0.0163	18.1570	6.1749	IN WET GAS
C:	0.0110	1.5687	0.0201	25.1290	8.5460	IN DRY GAS

EMISSION RATE:

COMPONENT	LBS. PER HOUR	GRAMS PER SEC.	LBS. PER UNIT OF PRODUCTION
A:	2.0250	0.2551	2.2450
B:	0.0002	0.0000	0.0002
C:	0.2215	0.0279	0.2456

ADM OC8630

DATE OCT 1 1975

START TIME 1:30 PM

ID NO. 63 121 AAC

STACK SAMPLED-- INCINERATOR

SOURCE OPERATION NO. 6

FIELD DATA:

ORIFICE CONSTANT K=0.506 PITOT TUBE FACTOR FS= 0.83

TEMPS. RECORDED IN FA DEGREES

METER CORRECTION FACTOR= 1.02

GAS ANALYSIS: Z=NONE

MOLECULAR WT. OF Z= 0.0

MOLECULAR WT. OF STACK GAS = 26.83

DRY MOLECULAR WT. OF GAS = 30.22

O2	N2	CO2	CO	H2O	Z	VOL	TW	PW
0.068	0.818	0.114	0.0	0.277	0.0	30.200	70.89	29.9024

PARTICULATE

DETERMINED BY

BY WEIGHT

= 0.2002 GRAMS

P.C.B.

DETERMINED BY

BY TITRATION

= 0.0000 GRAMS

CL2

DETERMINED BY

BY TITRATION

= 0.0219 GRAMS

LEAK TEST ON EQUIPMENT=0.005 CFM AT 15.00 IN.HG

BAROMETER= 29.90 IN.HG; STACK DIAM= 19.000 IN.; NOZZLE DIAM = 0.31

ZONE	VEL HEAD HP	STACK TEMP TS	STACK PRESS H2O	TIME ATEND	VOLAT END	COND TEMP	METER IN	TEMP OUT	METER HG	PRESS FIN	FLOW ORIF H2O
0	0.0	149.0	-0.4	0.0	428.50	D	64.0	64.0	0.0	0.0	0.0
1	0.200	149.0	-0.4	8.0	431.84	51.0	68.0	64.0	0.0	0.0	0.6
2	0.300	149.0	-0.4	16.0	435.82	51.0	74.0	64.0	0.0	0.0	0.9
3	0.340	149.0	-0.4	24.0	439.97	53.0	80.0	65.0	0.0	0.0	1.1
4	0.330	149.0	-0.4	32.0	444.11	55.0	80.0	66.0	0.0	0.0	1.0
5	0.170	149.0	-0.4	40.0	447.29	53.0	74.0	66.0	0.0	0.0	0.5
6	0.230	149.0	-0.4	48.0	450.84	54.0	80.0	66.0	0.0	0.0	0.7
7	0.300	149.0	-0.4	56.0	454.84	56.0	83.0	68.0	0.0	0.0	0.9
8	0.270	149.0	-0.4	64.0	458.70	58.0	82.0	68.0	0.0	0.0	0.8

ADM GC8631

W.G. KRUMMRICH PLANT SAUGET, IL 62201. ID NO. 63 121 AAC

DATE OCT 1 1975 START TIME 1:30 PM

STACK-SAMPLED- INCINERATOR SOURCE OPERATION NO. 831

CALCULATION AND EVALUATION:

THE ISOKINETIC CONSTANT NO/HP FOR THIS EQUIPMENT IS 13.0114

THE TABLE BELOW SHOWS, FOR EACH ZONE, THE METER VOL. AND THE AVG. METER AND PRESS. IN ABSOLUTE UNITS. FROM THIS IS CALCULATED THE EQUIVALENT STACK CONDITIONS AND DIVIDED BY TIME TO GIVE THE FLOW IN THE NOZZLE. COMPARED WITH THE ISOKINETIC FLOW RATE CALCULATED FROM THE STACK VELOCITY PERCENTAGE DEVIATION IS RECORDED.

ZONE	TIME	VEL.	METER	STACK	METER	STACK	METER	STACK	ACTUAL	ISOKIN	DEV
1	8.0	27.6	29.9	29.9	525.0	609.0	3.3	5.5	0.69	1.27	-46.07
2	8.0	33.8	30.0	29.9	527.5	609.0	4.0	6.5	0.81	1.56	-47.74
3	8.0	36.0	30.0	29.9	530.8	609.0	4.2	6.7	0.84	1.66	-49.10
4	8.0	35.5	30.0	29.9	532.8	609.0	4.1	6.7	0.84	1.63	-48.66
5	8.0	25.5	29.9	29.9	531.5	609.0	3.2	5.2	0.64	1.17	-45.00
6	8.0	29.6	30.0	29.9	531.5	609.0	3.6	5.8	0.72	1.36	-47.19
7	8.0	33.8	30.0	29.9	534.3	609.0	4.0	6.5	0.81	1.56	-48.14
8	8.0	32.1	30.0	29.9	535.3	609.0	3.9	6.2	0.78	1.48	-47.35
TOTAL	64.0	31.7	30.0	29.9	531.1	609.0	30.2	49.0	0.77	1.46	-47.55

T	AV	AV	AV	AV	AV	T	T	AV	AV	AV
---	----	----	----	----	----	---	---	----	----	----

TOTAL SAMPLE VOL. CORRECTED FROM STACK CONDITIONS TO STD CONDITIONS= 42.59 CUBIC FT. OF WET GAS

TOTAL SAMPLE VOL. CORRECTED TO DRY STD CONDITIONS. = 30.78 CUBIC FT

ADM CC6632

Facility: Monsanto Company
W.G. Krumrich Plant
Route 3
Sauget, IL 62201

Date of Inspection: January 27, 1976

Participants: Monsanto
Paul Heisler
Clarence Buckley

U.S. Environmental Protection Agency
Edwin Zylstra
John Connell
Charles Miller

Background:

Monsanto is the sole manufacturer of PCB in the United States. Production figures for the first nine months of 1975 are listed below:

Aroclor	Thousands of Pounds
1016	10350
1242	5120
1254	6980

Starting during the latter part of 1972, the only use for PCB compounds is in the manufacture of transformers and capacitors.

Process:

The chlorinator is charged with biphenyl and ferric chloride (catalyst) and then heated. Vaporized chlorine is fed into the chlorinator. The contact time varies from 12 to 36 hours, depending on the type of Aroclor to be produced, which determines the degree of chlorination. The vapor from the chlorinator (HCl containing PCB) goes to the scrubber where it is washed with liquid Aroclor. The gaseous HCl is sent to the purification section of the plant. The crude Aroclor goes to the Blower tank where it is blown with dry air for several hours. The air is scrubbed with water and vented to the atmosphere through a demister, the crude product is sent to a storage tank where a few tenths of 1% of alkali is added to react with any remaining hydrogen chloride or ferric chloride.

The method of distillation of the raw Aroclor varies depending upon the product to be produced. For types 1254, 1242, and 1221, the process is the same. Each is distilled in a vacuum still, the condensate being the finished product and the bottoms being the Montars which are sent to incineration. For Aroclor 1016, the crude aroclor is distilled in a vacuum distillation tower. The steam from the steam jet ejectors is partially condensed; the condensate being discharged into the plant discharge sump and the vapor exhausted to atmosphere. The overhead from the distillation tower is the product 1016 and is sent to storage. The bottoms are sent through another chlorination and distillation cycle. The overhead from this still is the finished product and the bottoms are the Montars which are sent to incineration. The three possible places where PCB can escape into the atmosphere are: vapor from jet ejectors; exhaust from the scrubber; and surface area evaporation (in general).

All aroclors are stored at 150°F with a layer of nitrogen on top of the liquid.

Incineration:

There are three points in the process that go to the incinerator: Montars, bottoms from separator sump, collection from all drip pans. In addition waste material from the users of PCB is sent to Monsanto to be destroyed. The type and concentration of these waste are unknown but it is estimated that they contain about 90% PCB. The amount of contaminated waste disposed of for the first nine months of 1975 is listed below:

	Thousands of Pounds
Customer returns, records exists	1109
Monsanto, records exists	322
Total receipts	1431
Destroyed by incineration	2808

The liquid waste stream is steam atomized and fed into the fire box. The feed is incinerated at a temperature above 2200°F with natural gas used for combustion with 5% excess oxygen and a retention time of 2-3 seconds. The gases go through a quench pot, the exhaust of which passes through a venturi scrubber and then through a packed tower which is irrigated by the weak muriatic acid originating from the quench pot. The exhausts are vented to atmosphere through a demister and are monitored.

Loading and Unloading:

The majority of the PCB components and the products made using PCB are liquid and are transported in bulk or in steel drums. Bulk shipments are made in railroad tank car and tank trucks. Waste material shipped in from other locations in 55 gallon drums or tank trucks are unloaded into a concrete pit; the material in this pit is periodically pumped to one of four 20,000 gallon incinerator waste feed tanks. The waste material that is shipped in by rail truck is unloaded into a 500,000 gallon storage tank and is pumped into the feed tanks when required. In the truck or railcar loading area, drainage is directed into a small concrete pit which is periodically pumped into the basins located in the manufacturing area. Relief valve lines and atmosphere vents are routed through catch tanks or are redirected to underground settling basins.

UNITED STATES GOVERNMENT

Memorandum

TO : Gerald F. Regan, Chief, Air Surveillance Branch

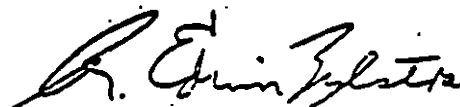
FROM : Technical Advisor, Special Projects Section
Air Surveillance Branch

SUBJECT: Calculation of PCB Air Emissions from Storage and Dispensing Operations at the Krummrich Plant of Monsanto

DATE: March 5, 1976

Potential air emissions from the storage and dispensing of PCB were calculated based on information supplied by Monsanto. The results of these calculations are:

Storage tanks for virgin product	- 597.4 kg/year
Product loading	- 0.0184 kg/year
Storage and handling waste reactors	- 0.00066 kg/year


R. Edwin Zylstra

Attachment (Calculations)

ADM CC6636



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Clarence Buckley of Monsanto estimated that storage and loading operations at the plant would displace the following volume of headspace gases:

1. Storage tanks 635,000 ft³
2. Loading 460,000 ft³

Calculation of emissions:

From Fig. 2.2 from the Draft Mitre report the vapor pressure of Aroclor 1242 is 3 mm Hg at 100°C and 10⁻⁴ at 21°C. The aroclors are stored at 100°C. It may be assumed that the temp. in the tanks being loaded would be approximately 70°F (21°C).

From Dalton's law of partial pressure:

$$B_x = \frac{P_x}{P_{\text{mix.}}} \text{ where } B_x = \text{proportion by volume of a gas component}$$

P_x = partial pressure of gas component and
 $P_{\text{mix.}}$ = absolute pressure of gas mixture.

$$B_x = \frac{3}{760} = \frac{0.0039}{1} \text{ or } 3900 \text{ ppm at } 100^\circ\text{C}$$

To change ppm to mg/M³ use the following formula:

$$\text{mg/M}^3 = \text{ppm} \times \frac{\text{mol. wt.}}{\text{molecular volume}}$$

$$\text{mol. wt.} = 261$$

$$\text{molecular volume} = 30.62 \text{ liters/mol. at } 100^\circ\text{C}$$

$$\text{mg/M}^3 = 3900 \times \frac{261}{30.62} = 33242$$

Emissions from storage tanks:

Emissions kg/year = Vol. of gas displaced/year x concentration of PCB

$$\text{Kg/yr} = 635000 \text{ ft}^3 \times .0283 \frac{\text{M}^3}{\text{ft}^3} \times 33242 \times \frac{1 \text{ kg}}{10^6 \text{ mg}}$$

$$\text{kg/year} = 597.4$$

Emissions from loading operations:

$$B_x = \frac{P_x}{P_{\text{mix.}}} = \frac{10^{-4}}{760} = 1.3 \times 10^{-7} \text{ or } .13 \text{ ppm}$$

$$\text{mg/M}^3 = .13 \times \frac{261}{24.04} = 1.41 \text{ mg/M}^3$$

Emissions:

$$\text{Kg/yr.} = 460,000 \times .0283 \times 1.41 \times \frac{1 \text{ kg}}{10^6 \text{ mg}}$$

$$\text{Kg/yr.} = 0.0184$$

Emissions from handling of waste areolors:

Total waste material received into plant as reported by Monsanto for 9 mos. of 1975 - 1,431,000 lbs. Assume that all this material is received and stored at 70°F and that it displaced an equal volume of tank headspace gas at 70°F.

$$\text{Volume of produce} = 1,431,000 \text{ lbs.} \times \frac{1 \text{ gal.}}{11.5 \text{ lbs.}} \times 3.785 \frac{\text{liter}}{\text{gal.}}$$

$$\frac{1}{\times 10^3} \frac{\text{liters}}{\text{M}^3} = 471 \text{ M}^3$$

The concentration would be the same as in the loading operation that is 1.41 mg/M³.

Emissions:

$$\text{Kg/yr.} = 471 \text{ M}^3 \times 1.4 \text{ mg/M}^3 \times \frac{1 \text{ kg}}{10^6 \text{ mg}}$$

$$\text{Kg/yr.} = .00066$$

SUBJECT: PCB Monitoring - Monsanto, Krummrich Plant, Sauget,
Illinois.

DATE: FEB 13 1976

FROM: Charles Miller/Ed Zylstra/John Connell, Technical Advisors, SPS

TO: Gerald F. Regan, Chief, Air Surveillance Branch

On January 27, 1976, the SPS field team (Miller, Zylstra, Connell) performed ambient air monitoring for PCB's at the Monsanto Krummrich Plant, Sauget, Illinois. Although Monsanto presently manufactures PCB's at this facility, production of PCB's is to be gradually phased-out.

After a brief discussion and orientation period with Monsanto officials, ASB and ILDO personnel toured the PCB manufacturing area including the incinerator facility. The "plant" area where PCB's are manufactured is not an enclosed structure per se. It is an open structure constructed of steel grating (floors, stairs), safety railings, a maze of piping, collection and reaction vessels, valves, etc. all of which are completely exposed to the elements. Mr. Claire Buckley of Monsanto was assigned as escort for ASB personnel.

Only two locations were deemed appropriate as sampling sites for PCB's. Other possible sites were inaccessible or had recently been tested by Monsanto - ie. - the recent incinerator test results were furnished by Monsanto. These two sampling locations, the cleaning of glassware, equipment used, sampling procedure, samples obtained, etc. is described below:

Site Location #1 (SEG) - Steam Ejector - Ground Level.

This steam ejector pipe terminated just above a grate which covered a recessed concrete trough in the floor at ground level. For collection of the samples, the SPS field team used the glass bubblers, Y-connector with reducer coupling, U-tube, cold trap and vacuum pump. The H-frame base, and 2x4 manifold support and glass manifold were not used. Sampling was performed for a one-hour period, 1046 - 1146 hours.

Site Location #2 (SET) - Steam Ejector - Top Level or 2nd Level Above Ground.

These twin steam ejector pipes (somewhat of a candy-cane configuration) terminated out beyond the 2nd level safety railing. Sample collection was performed using the same equipment as at Site Location #1 and included the H-frame base, one section of 2x4 manifold support, and one section of glass manifold. Sampling was performed for a one-hour period, 1205 - 1305 hours.

The following narrative defines the process for cleaning of the sampling glassware, the actual preparation for sampling, and handling of the samples collected in the bubbler train.

The ASB, SPS field team cleaned all PCB monitoring glassware via the following procedure:

1. Thoroughly wash all glassware with a solution of PCB free detergent. The concentration of the detergent is determined by the manufacturer's instructions.
2. Rinse thoroughly with tap water.
3. Rinse thoroughly with distilled water.
4. Rinse thoroughly with acetone (reagent grade or better).
5. Rinse with hexane, rinse each bubbler three times with 50 ml. of hexane for each rinse and discard.
6. Wrap all small glass parts in aluminum foil and ensure proper sealing, crimping of the foil. Seal all ball joints of the bubblers with aluminum foil (alternately, appropriate ball joint fittings - sealed on one end and thoroughly cleaned - may be clamped in place instead of using aluminum foil; the purpose of the above is to prevent contamination of the now PCB free glassware).

Upon determination of a sampling site location, the sampling equipment supportive framework is set-up and all glassware bubbler box, pump, etc. are positioned. The sampling procedure is as follows:

1. Remove seals (foil or ground joints and clamps) from the bubblers.
2. Place 300 ml. hexane into bubbler #1, shake, pour into bubbler #2, shake, pour into bubbler #3, shake, pour into a sample bottle appropriately designated as a reagent blank. This procedure is performed for both sides (A and B) of the sampling train.

3. Pour hexane, 400 ml., 200 ml., and 300 ml. into bubblers #1, #2, and #3, respectively.
4. Connect the entire sampling system - U-tube, manifold, reducer coupling, Y-tube, U-tubes between each bubbler and the copper tee (containing hypodermic needles - one for each side), the quick-disconnects between the tee and the cold trap and between the cold trap and the vacuum pump. Ensure that all ball joints are tightly clamped. Do not use any lubricant/sealing compound on the ground glass ball joints.
5. Fill the plywood box (containing 4 of the six bubblers) and the cold trap with crushed dry ice.
6. Start the vacuum pump; note the time and vacuum gage reading; sample for one-hour.
7. At the conclusion of the one-hour sampling period, note vacuum gage reading, tightly double the rubber hose between the copper tee and the quick-disconnect thus stopping air flow, pull both disconnects apart, and release the previously clamped or kinked rubber hose; shut off the vacuum pump.
8. Disconnect the Y-tube from the train.
9. Disconnect the bubbler U-tubes and the rubber hose - glass connection from last bubbler to the copper tee on one side of the train.
10. Pour the absorbing solutions from one side of the train (3-bubblers) into one sample bottle appropriately identified. All sample bottle screw caps must have Teflon liners. Absorbing solutions and rinses from each side of the train must be in separate sample bottles - 1 bottle per side of train.
11. Introduce approximately 50 ml. of hexane into bubbler #1, shake, pour into bubbler #2, shake, pour into bubbler #3, shake, and pour into the appropriate sample bottle from Step 10 above. Repeat this with another 50 ml. portion of hexane. Repeat for the second or other side of the sampling train.

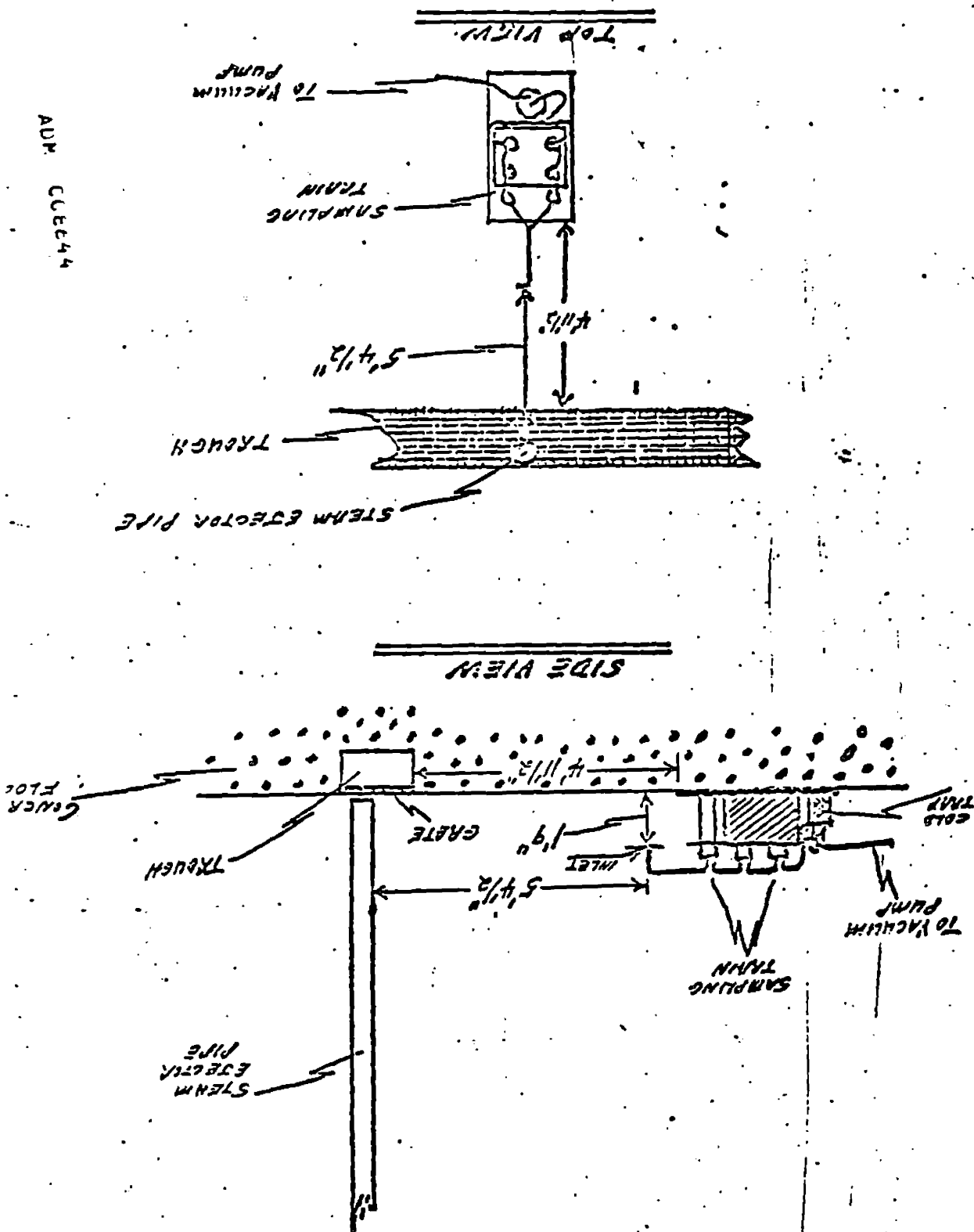
12. Introduce 300 ml hexane into bubbler #1, shake, pour into bubbler #2, shake, pour into bubbler #3, shake, and pour into another appropriately identified sample bottle. This is also a reagent blank. Repeat for the other side of the train.
13. The bubblers can now be properly filled with the designated amounts of hexane (400 ml., 200 ml., 300 ml.) for the next sampling period. If additional sampling is not required, the equipment (glassware) must be wrapped/sealed as defined in Step #6 of the cleaning procedure.

cc: Tom
Kallgren
Torrez
Zylstra
Connell

The table below defines the various samples collected at the Monsanto PCB manufacturing facility:

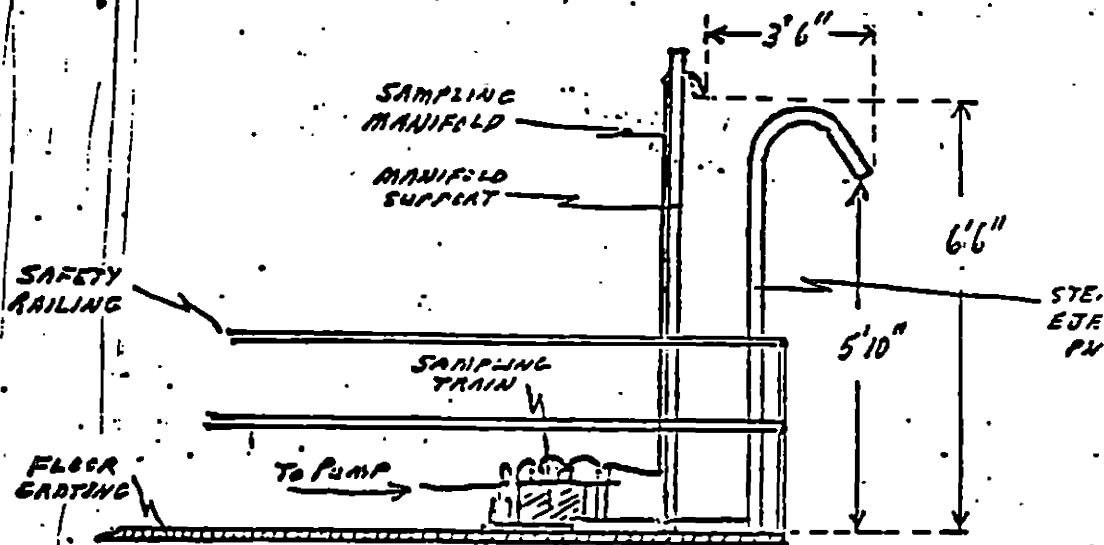
DATE	LOCATION	ASB DESIGNATION	LAB. NO.
1/27/76	Reagent Blank, Pre (SEG)	3A-T27-1	76-13656
1/27/76	Reagent Blank, Pre (SEG)	3B-T27-2	76-13657
1/27/76	Sample (SEG)	3A-T27-3	76-13658
1/27/76	Sample (SEG)	3B-T27-4	76-13659
1/27/76	Reagent Blank, Pre (SET)	3A-T27-5	76-13660
1/27/76	Reagent Blank, Pre (SET)	3B-T27-6	76-13661
1/27/76	Sample (SET)	3A-T27-7	76-13662
1/27/76	Sample (SET)	3B-T27-8	76-13663
1/27/76	Reagent Blank, After (SEG) Sample	3A-T27-9	76-13664
1/27/76	Reagent Blank, After (SEG) Sample	3B-T27-10	76-13665
1/27/76	Reagent Blank, After (SET) Sample	3A-T27-11	76-13666
1/27/76	Reagent Blank, After (SET) Sample	3B-T27-12	76-13667

SITE LOCATION #1 (SEG)

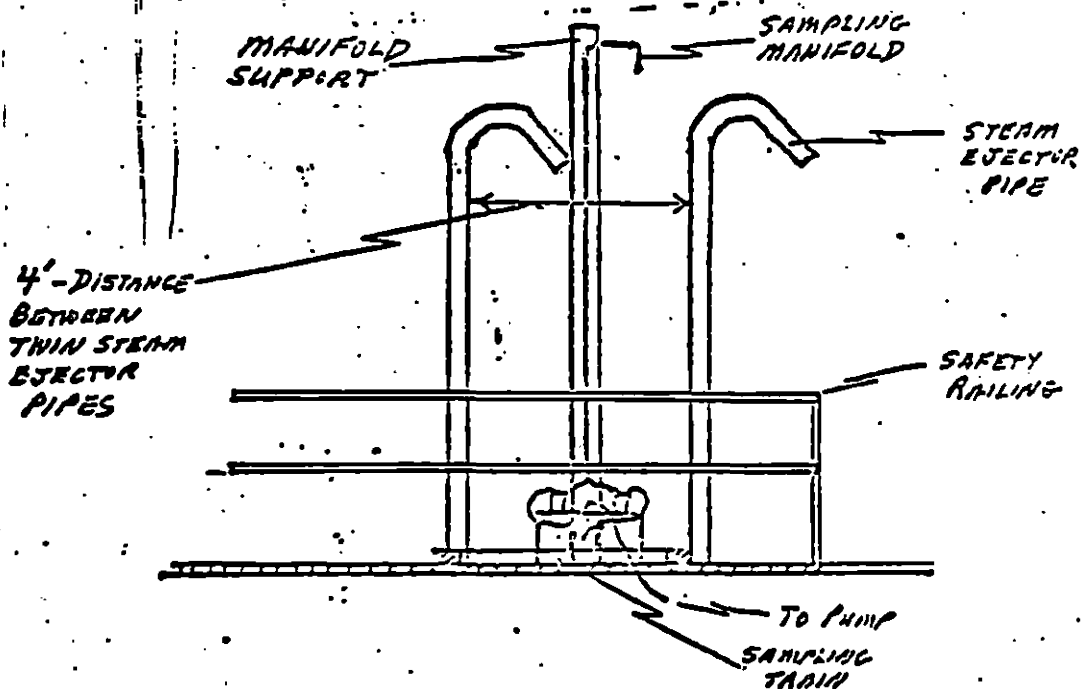


ADM. CUEC44

SITE LOCATION #2 (SET)



SIDE VIEW



FRONT VIEW

U. S. ENVIRONMENTAL PROTECTION AGENCY
REGION V, CENTRAL REGIONAL LABORATORY
1819 W. PERSHING ROAD, CHICAGO, ILLINOIS 60609

DATA TRANSMITTAL SLIP
Date Feb. 26, 1976

TO: Chief, Air Surveillance Branch
Surv. & Anal. Division *ELC*

DATA IDENTIFICATION

Data - Sample Numbers 13652-13657

RECEIVED

FEB 27 1976

AIR SURVEILLANCE BRANCH
EPA, REGION V

REMARKS

FROM

L. Dyer
DATA COORDINATOR, CENTRAL REGIONAL LABORATORY

ADM CCE646

تاریخ: ۱۳۰۲/۱۲/۲۵

1. Last Arrival Date: 7-2-77
Day Month Year

ה'תש"ח י"ב

AIR SAMPLES

Account No.

Study

all units are micrograms per liter or milligrams per billiongram

ALH CUB647

Monsanto-Sauget, Illinois

Sampling Location	Sample No.	Critical Orifice Flowrate m ³ /hour	Reagent Blank Values Before & After Each Sample ug/sample	Average Reagent Blank Values ug/sample	Sample Values ug/sample	Difference-Sample Minus Ave. Blank Value	Final Value ug/m ³
Site #1 Steam Ejector-Ground Level (SEG)	76-13658	3A-0.71402	7.0 / 16.8	11.9	31.5	19.6	27.5
	76-13659	3B-0.63602	4.7 / 3.3	4.0	25.0	21.6	33.9
Site #2 Steam Ejector-Top Level (SET)	76-13662	3A-0.71402	N.A. / N.A.		72.5		
	76-13663	3B-0.63602	12.1 / 8.4	10.3	N.A.		

Monsanto

Interpretation of the data chart:-

Column 1- Sampling Location - corresponds to the preceding narrative defining sampling sites.

Column 2- Sample Numbers - assigned by ASB and for use by the analytical laboratory.

Column 3- Critical Orifice Flowrate (m³/hour) - calibrated flowrate of the critical orifice utilized on each side of the sampling train.

Column 4- Reagent Blank Values - Before and After Each Sample (ug/sample) - defines the analytical results determined for each reagent blank.

Column 5- Average Reagent Blank Values - simply the average of the two values in the preceding column.

Column 6- Sample Values (ug/sample) - analytical results of the samples submitted.

Column 7- Difference - Sample Value Minus Average Blank Value - defines a value representing only the sample.

Column 8- Final Value (ug/m³) - defines the final or actual value of PCB's obtained at the particular sampling location; determined by dividing the true sampling air flowrate into the corrected value (Column 7).

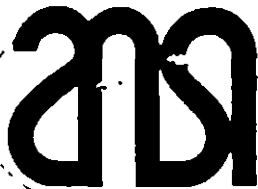
Monsanto

Comments:

It is unfortunate that Reagent Blank Values (before and after sampling) are not available for all such samples that were submitted for analysis. Additionally, the loss of one sample (76-13663) occurred as a result of a manufacturing defect (stress/strain) in the particular sample bottle.

At this point in time, the only meaningful conclusion that can be made is that the manufacturer of PCBs has and maintains significantly superior control of atmospheric emissions during PCB manufacture than does the user or consumer who utilizes PCBs in the manufacture of a PCB containing product. However, the amount of PCBs released is still significant and should be greatly reduced by more stringent controls. However, at this point in time, Monsanto has publicly declared that PCB manufacture will be gradually reduced and eventually phased out.

In comparing the data for the Sauget and Bloomington monitoring efforts, it is noteworthy that the accord or agreement between the Sauget reagent blanks and sample values (at the same site) is much improved even though the basic equipment-absorbing solution, sampling and analytical procedure and length of sampling period were identical.



american national standards institute, inc.

Address Secretary at:
National Electrical Manufacturers Association
821 Fifteenth St., N.W., Suite 438
Washington, D.C., 20005 (202) 347-4848

December 23, 1975

TO: ALL MEMBERS AND ALTERNATES OF ANSI SUBCOMMITTEE ON
USE AND DISPOSAL OF ASKAREL AND ASKAREL-SOAKED
MATERIALS IN ELECTRICAL EQUIPMENT, C107 And

ALL PARTIES HAVING AN INTEREST IN PCB's

Subject: Special Meeting on Polychlorinated Biphenyls

Gentlemen:

This is to advise you that a special meeting of ANSI
Subcommittee C107 is to be held:

Monday, January 12, 1976
1:00 P.M. - 5:00 P.M.
Tuesday, January 13, 1976
9:00 A.M. --
Sheraton O'Hare North (near O'Hare Field)
6810 N. Mannheim Road
Rosemont, Illinois 60018
Telephone: (312) 297-1234

This notice is being directed to all members of the Committee,
according to our latest roster, and to a large number of users
of PCB's, government agencies and trade associations.

The purpose of this special meeting is to consider revising
ANSI Standard C-107.1-1974 "Guidelines for Handling and Disposal
of Capacitor- and Transformer-Grade Askarels Containing Poly-
chlorinated Biphenyls", and also to consider adding new information
not in the present document.

Most of you, I am sure, are aware that there has been a
great deal of recent publicity on the environmental problems
associated with PCB's. The work of this Committee has taken on
a new sense of urgency and all receiving a copy of this meeting
notice are urged to attend this meeting.

PLAINTIFF'S
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95

ACM CC8602

The rather lengthy agenda is being prepared and should go out of this office before January 1, 1976.

If you plan to attend the meeting, please make your own room reservation advising the hotel that you are attending the ANSI C-107 PCB meeting. We have a block of rooms reserved which will be held for us until January 6, 1976.

Please complete the enclosed attendance postal card and return as soon as possible.

Sincerely,

C. R. Willmore / pmk
C. R. Willmore
Secretary, ANSI C107

CRW:pmk
Encl.

cc: J. R. Wessell, FDA
G. Bull, GE Svc.
R. Rollins, Jard Co.
Dr. S. D. Ross, Sprague
E. VanBuskink, Mallory
W. Courtade, Niagara
J. Nay, Hevi-Duty
W. A. Richter, Allegheny Power Svc. Corp.
K. Klein, ERDA
E. Huber, UL
R. Gregory, Rollins Environmental Svcs. Corp.
W. Phillipbar, "
C. Bremner, EPA
D. Gebhart, EASA
Assn. of Amer. Railroads
Factory Mutual, Technical Director
American Public Power Assn.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
1735 BALTIMORE - ROOM 249
KANSAS CITY, MISSOURI 64108

September 12, 1972

SVAN-DAHS

Dr. W. B. Papageorge
Monsanto Research Labs
800 North Lindbergh Blvd.
St. Louis, Missouri 63166

Dear Dr. Papageorge:

We enclose copies of tracings obtained by Dr. Hector Rodriguez from running Samples Nos. 103 and 104 and Aroclor 1242, as promised during our recent telephone conversations.

Sample 103 was taken from the top and 104 from the bottom of the oil storage tank at Bliss Waste Oil Disposal Company. We also are sending samples of these oils.

If we can be of further assistance, please call either Dr. Rodriguez or myself at (816) 374-4461.

Yours very truly,

W. L. Banks

W. L. Banks
Chief

Oil and Hazardous Substance Branch

Enclosure

50 ppm

1-ppm

Handwritten notes and initials on the right margin.



ACH CG8651

9/8/72
5.50V-1 Gt+ glass

①

150°C oven
90cc/min flow

103 = 1ml to 10cc hexane
104 = " " "

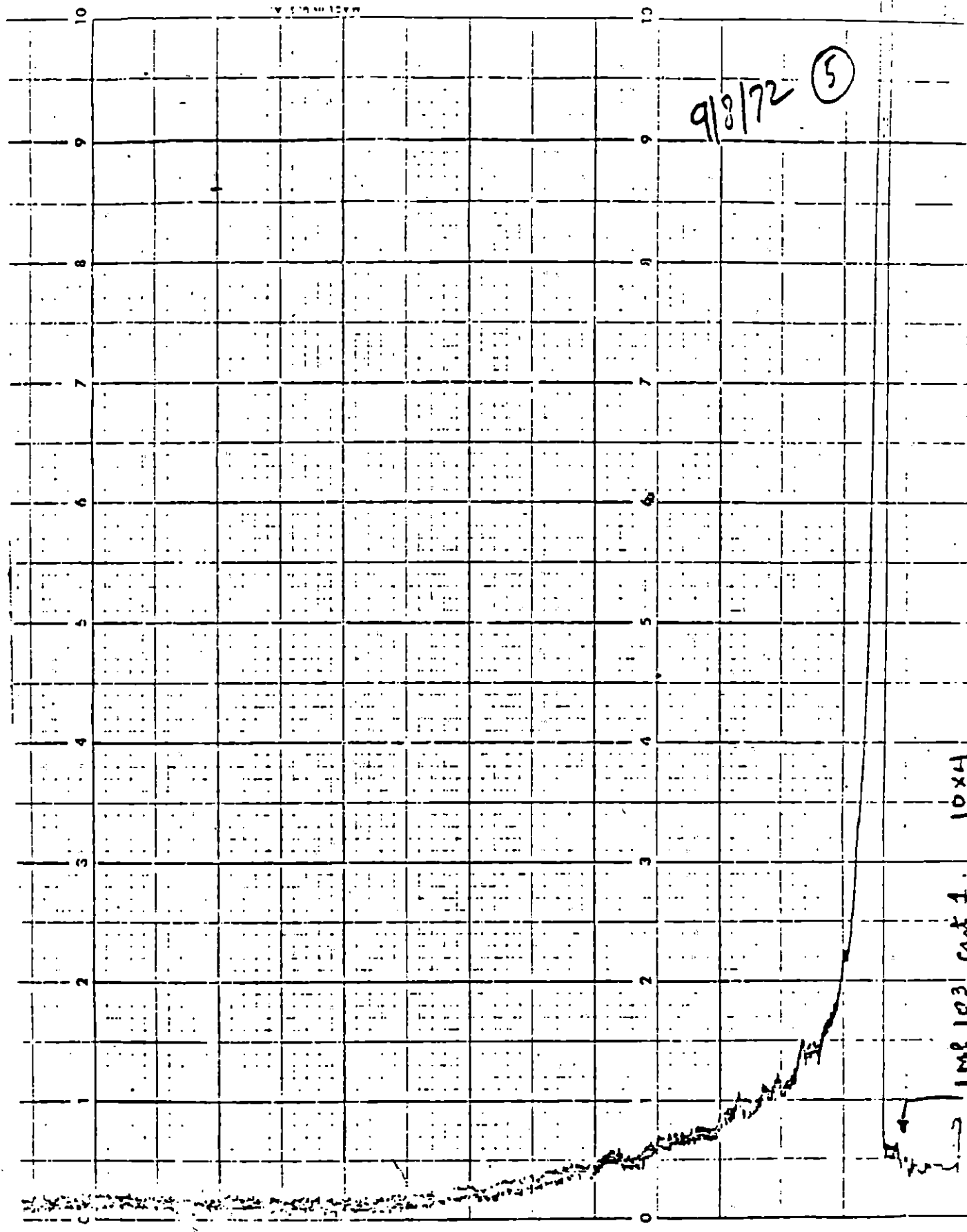
1:100 I
1:100 II

103 { 1st cut } .1 ml of above to 10cc
104 { " " }

103 { 2nd cut } .1 ml of above to 10cc.
104 { " " }

1/2" / min

103
104



9/8/72 (5)

IME 103 cut 1

10x4

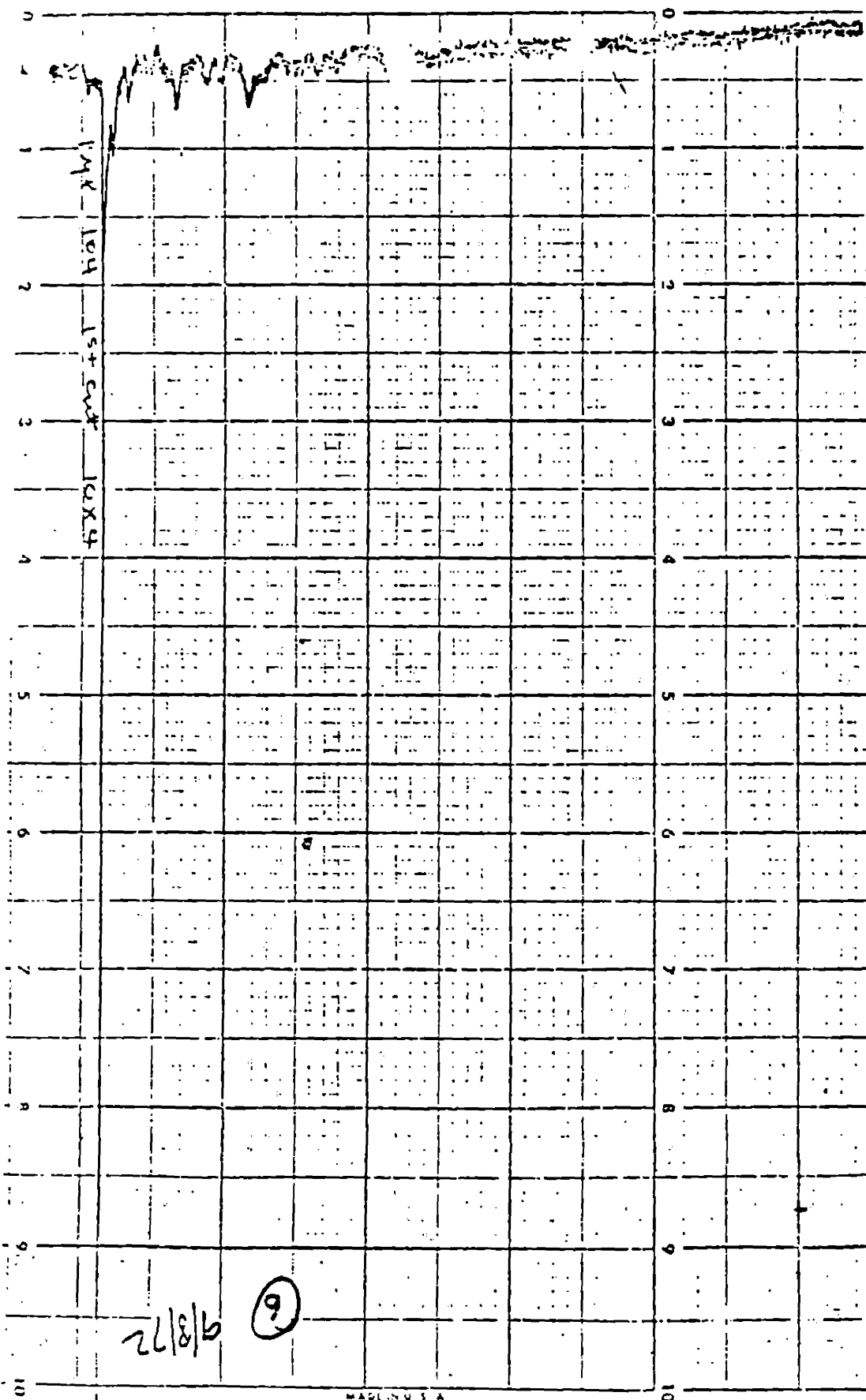
NO. 430743 INDS. NORTHWEST CO. PHILA.

ACM CC8653

ADM CCB654

No 400742

LEEDS & NORTHUP CO PHILA



⑨
21912

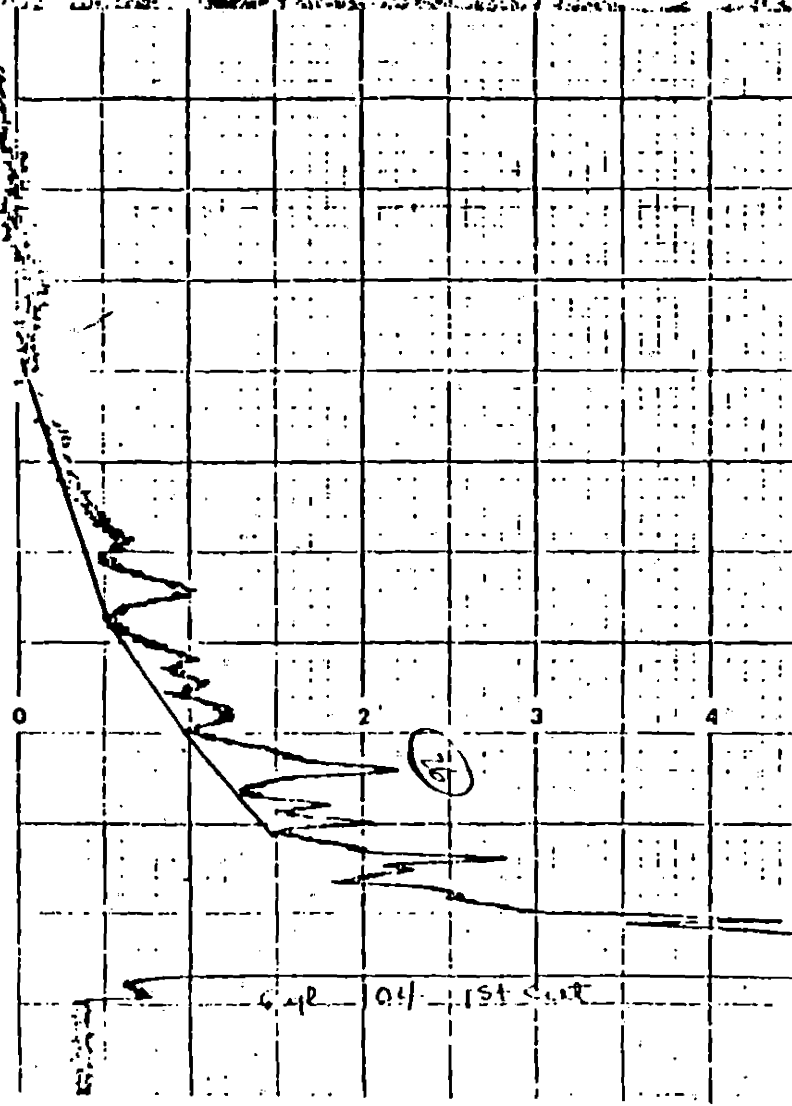
average area above 10x4

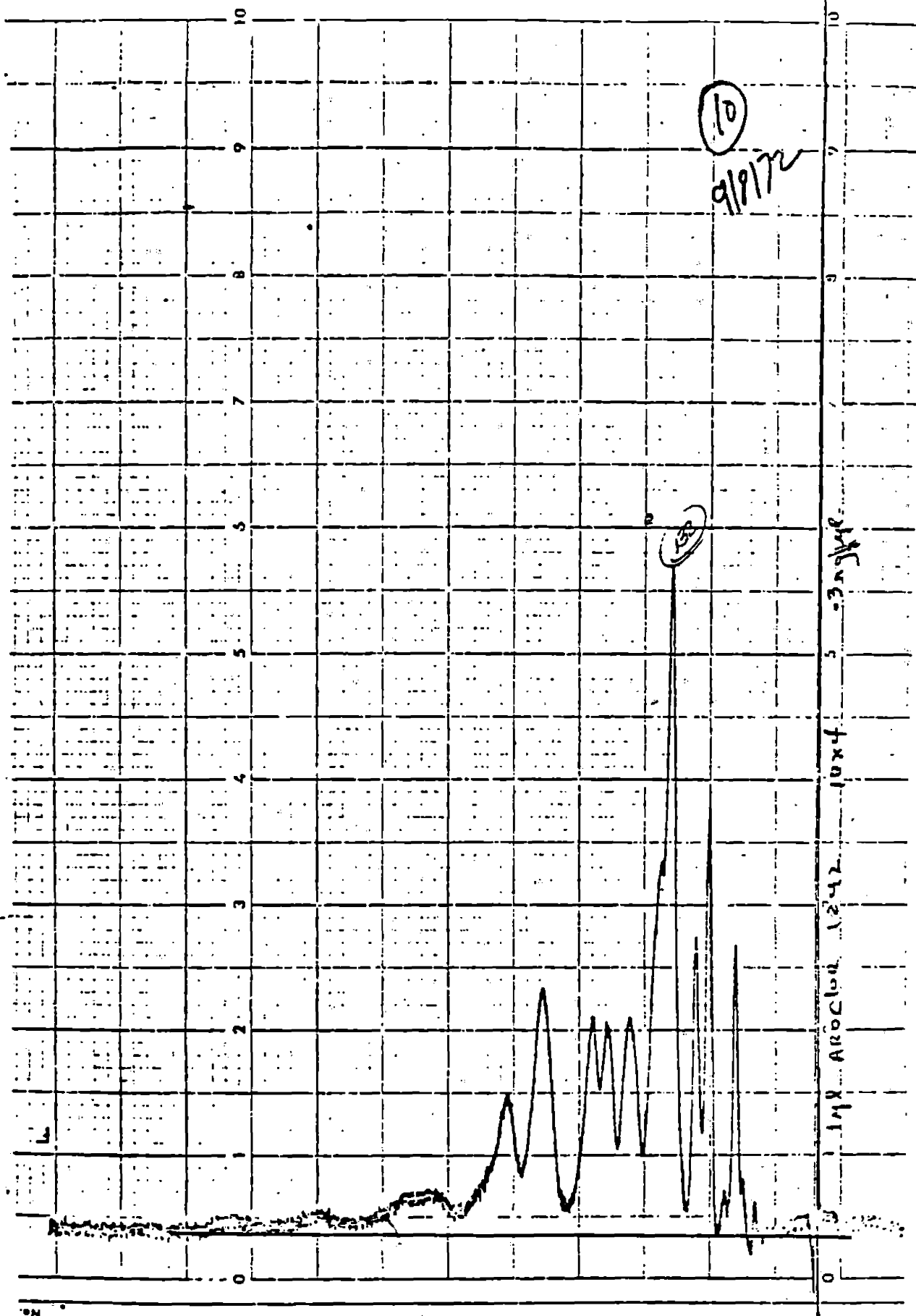
$$\frac{0.3 \text{ mg}}{132} = \frac{\text{mg}}{26} = 0.06 \text{ mg}$$

average density of oil = 0.87

$$\frac{0.06 \text{ mg}}{\text{ft}^2} \times \frac{10 \text{ ft}^2}{\text{ft}^2} \times \frac{1}{10 \text{ ft}^2} \times \frac{1}{0.87} = 11.5 \text{ ft}$$

⑩







UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

January 14, 1976

OFFICE OF ENFORCEMENT

MEMORANDUM

TO: Regional Administrators
Regional Enforcement Directors
Regional Surveillance and Analysis Directors
NPDES Approved States
NEIC Director, Denver
NERC Director, Cincinnati
RTP Research Director

FROM: Acting Director, Permits Division (EN-036)

SUBJECT: Identification and Control of PCBs in Transformer and Capacitor Plants

Perspective

Our initial considerations, including a check list for surveying transformer and capacitor plants, were given as Exhibit D in the December 22, 1975, memorandum from the Assistant Administrator for Enforcement, Mr. Stanley Legro. Since then, a meeting on this subject was held on January 7, 1976, at Crystal Mall #2, Arlington, Virginia. The purpose of this memorandum is to provide guidance on sampling and analytical matters as well as additional items for inclusion to the plant survey checklist as suggested by the conferees at the January 7 meeting. In addition, Office of Solid Waste Management has prepared a checklist for Off-site Disposal, which is also attached.

At this time it would be expected that most of the sampling for this program will be for PCBs in water. There would be a limited number of solid samples and no air samples would be taken.

At least two regions, i.e., II and V, as well as NEIC-Denver, already have had noteworthy experience with field sampling for PCBs and analyzing down to trace levels, which is reflected in the following guidance.

Finally, since EPA's interest in these inspections relates broadly to PCBs destined for the total environment (not only the water environment), the attached Off-site Disposal checklist should assist team members in ascertaining the actual disposition, especially off-site, of waste materials.

ACM CC8657

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This waste management checklist was distributed to the attendees at the January 7 meeting and the Regional solid waste representatives. It is clear that any effective assessment of PCB waste disposal problems from these surveyed plants will require responses to the questions posed in this waste management checklist.

Sampling

Water samples should be taken in a manner which is consistent with Standard Methods. We are looking for sensitivity of detection to the most minute trace quantities and are not as yet fully aware of the problems to be encountered with field sampling at that level of sensitivity. It appeared at the above referenced January 7 meeting that appropriately cleaned (hexane solvent) glass containers would be satisfactory for this program.

The samples should be received in quart or gallon glass bottles with Teflon lined screw caps. In this regard, it is expected that the method to be followed for use of solvents, reagents, glassware, and other sampling apparatus would be that which is described in "Method for Polychlorinated Biphenyls (PCBs) in Industrial Effluents" as developed by the section 304g task force involving NERC Cincinnati. There may be some minor modifications of this procedure in the various regions with suitable justifications. However, any questions concerning the availability of the description of the method itself or possible significant deviations therefrom should be called to our attention (Dr. Murray Strier 703-557-7423).

Enough sample volume should be taken to allow for duplicate and spiked sample analysis, approximately 1 gallon. It is also anticipated that some of the more dilute samples, i.e., less than 1 ppb, will be split among the laboratories in a round robin program to be coordinated by NERC-Cincinnati.

A sample representative of the effluent during an operating day (e.g., composite) should be taken at major outfalls, in particular, the process outfall, stormwater outfall and sanitary discharge point. For other samples, a well timed grab sample should be adequate. No special precautions for sample preservation have been identified as necessary to date.

Solid samples will be collected on a limited basis only. In this regard, it is important to remember that PCBs are mixtures of polychlorinated biphenyl compounds; each singular compound, by itself, is likely to

be a solid and there is a liquid phase only when there are enough components present in suitable composition. Points of interest for solid sampling are as follow:

- a. Soil in shipping and receiving area(s);
- b. Soil in land disposal area(s);
- c. Spent filter aid and filter cloth;
- d. Spent activated carbon, if any;
- e. Saw dust or other solid particle floor sweeping aid; and
- f. Miscellaneous solid scrapings of insides of storage and transfer vessels, hoods and vents, suspicious-looking floor deposits.

Solid samples should be collected in wide-mouth sampling dishes with ground glass covers, cleaned similarly as glass sampling bottles for liquids.

Air samples are not required at this time. However, it may be possible to estimate vapor losses from storage tank usage considerations and from filling liquid handling and transfer specifics. Details on these losses may be available from the plant manager.

Analysis

In general, the standard method referenced above calls for liquid-liquid extraction of PCBs from aqueous phase to organic solvent. A combination of the standard Florisil column cleanup procedure and a silica gel microcolumn separation are employed. Identification is made from gas chromatographic patterns obtained by use of two or more unlike columns. The limit of detection is in the range of 1 ppb.

According to Dr. Mieggs of NEIC Denver, his laboratory has a more expeditious column separation technique involving alumina instead of the florisil-silica gel separation procedure. Although, obviously, the purpose of this program is not explicitly to depict the better or more desirable procedure, it would be of interest to compare the two methods during the latter stages of the program. At this time it would be preferred to use the former technique as it is the more familiar and generally accepted method.

We wish to recommend the procedures used by Region II S & A (contact Dr. R. Spear, 201-342-7556) for analysis of soil and fiber samples. Region V (contact Dr. T. Yates, 312-353-6738) may be able to provide comparably acceptable procedures.

For the concentration range below 1ppb, mass spectrographic analysis will be necessary. While no standard method has been identified, analytical procedures are in use in certain labs (i.e., NEIC, Regions II and V) that give results down to a range of approximately 10 ppt. We will ask NERC-Cincinnati to assist in providing guidance in this area and will forward it at a later date.

It is important to continue to realize that PCBs are mixtures of compounds and that the analysis is most credible when individual compounds have been identified.

At this point, those regions or states which feel that they do not have adequate laboratory facilities to perform the requisite analytical determinations should contact NEIC-Denver (Director, T. Gallagher at 303-234-4650).

Carl J. Schafer

Attachments

Off-Site Disposal Checklist

Purpose: To track wastes from plant and/or temporary storage to ultimate destruction or deposition; compare actual disposition of wastes with generator's expectations

Transport Phase

1. Who is responsible for transport of wastes from plant and/or temporary storage? (including name of company, address, and responsible officials)
2. Is transporter licensed for (a) interstate (b) intrastate transport?
3. Is the transport agent also responsible for disposal?
4. Is not, what are normal arrangement for disposal of wastes by the transporter?
5. What, if any, State restrictions must be met?
6. What assurances, if any, does the generator have that the wastes reach the expected disposal facility? (In California, hazardous waste manifest should be available for examination). What precautions if any are taken in the selection of the transporter? Bonding? License? Knowledgeability?
7. Are the contaminated wastes isolated for the transporter? Does the transporter maintain this integrity (by isolation, separate pick-up, etc.)?
8. How does the transporter know, if at all, that wastes are contaminated with PCB? (e.g. by purchase requisition, label, color codes, or other identification showing quantity, concentrations of PCB's etc.)
9. Does the transporter take any placarding/labeling precautions regarding (especially) liquid wastes? What specific label/placard is placed on a shipment of PCB-contaminated wastes? On truck-load? On barrels/containers?
10. What resources (e.g. guides, references), if any, are available to the transporter or on the vehicle to aid emergency personnel in case of accident?

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ACM CCB661

Treatment/Disposal Phase

1. What is the treatment (incineration) or disposal site for the wastes? (including name of company, address, and responsible officials). (Note: In advance of visit to site, it is advisable to consult available literature on such facilities - see list of references).
2. Is the facility permitted by State air, water or land agencies? If so, what are permit conditions?
3. ^AHow is the transporter's vehicle directed? ^BWhat are controls to avoid mishandling/misdirecting the wastes?
4. Receipt, transfer, storage area information (especially at incineration facilities) - refer to related check list question from capacitor plant list.
5. For incineration facilities, what kind of incinerator is employed? Is waste treated prior to incineration? What are combustion temperatures, dwell times, excess air ratios when PCBs are burned? How are these levels assured?
6. In what form and how are wastes fed into the incinerator? What are feed rates, destruction efficiency? What is potential for escape of unburned PCB's to environment?
7. What are the pollution control devices on the incinerator? What is their efficiency? What happens to the pollution control residuals (e.g. scrubber water)?
8. What monitoring and/or instrumentation is available on the incinerator?
9. Is there provision for emergency shut-down of waste feed, etc. in the event of malfunctions, especially of the pollution control devices?
10. What is the disposition of the ash?

(Note: In the event that PCB-contaminated wastes are being incinerated during a visit, grab samples of scrubber water and ash as well as data on kind and amount of waste being burned would be useful. Samples of waste type to determine

its chemical and physical characteristics would also be interesting. It would also be useful to ascertain if stack sampling would be permitted by the owner at some future time).

11. For land disposal sites, how are wastes emplaced in the land? In what form are they? Are they segregated from other wastes? Are they "treated" in any way before burial? What kind of liner-either natural or artificial - is used underneath the PCB disposal area? What is depth to groundwater? What types of soil characterize the area?
12. What provisions are made to avoid air and water emissions during handling?
13. What provisions exist to prevent surface water contamination during accidents, spills, flooding, etc.?
14. What records are kept of the types and amounts of PCB waste received? What records are kept regarding location of these wastes on the site plot?
15. Is groundwater monitoring conducted? How many wells are used? What parameters are tested and how often? By whom? Would water samples be available to EPA for analysis?
16. Is any air monitoring conducted?
17. What provisions are there for site security, warning notices, limitation of public access, etc.?
18. Are fire protection, worker safety gear, outside communication links, worker first aid and hygiene facilities available?
19. Is the local fire authority aware that PCB contaminated wastes are present? Are they prepared to deal with them?
20. To what extent do workers appear aware of special hazards of the PCB waste stream vs. others?

Monsanto

FROM: M. F. Weishaar - G4WA (4-6631)

PCB file

DATE: July 8, 1980

SUBJECT: TSCA - PCB Marking
and Disposal Regulation

REFERENCE:

TO: W. K. Condie - 1850
H. W. Curtis - 1740
G. W. Daues - 1890
C. M. Davis - 1850
J. G. DePagter - 1220
L. G. Duncan - 1850
J. D. Felder - 1760
J. B. Grimes - 1090
P. E. Heisler - 1740
F. C. Himes - 1200
G. Lunsford - 1890
R. B. Marquez - 1200
W. W. Perdue - 1220
J. W. Pickering - 1840
D. G. Williams - 1460
R. W. Graham - Rock Springs

cc: J. R. Condray - C2SA (w/o attach.)
J. H. Craddock - CS1H (w/o attach.)
W. B. Papageorge - G4WA (w/o attach.)

Attached is a copy of interim inspection guidance for PCB compliance inspections under TSCA. From what I understand this is the criteria document for compliance inspections; I don't know if it has been officially implemented or not.

The portions of immediate interest to us are:

Marking Requirements	Pages 44-46
Storage Requirements	Pages 80-87
Decontamination	Pages 88-90
Records and Monitoring	Pages 91-97

Can you answer yes to all the issues raised?

M. F. Weishaar
M. F. Weishaar

MFW:ku
Attachment

ACM CC6665

