

MAR 2 1976

bcc: G. Roush
J. P. Mleure
W. W. Withers
R. G. Potter
W. C. Hammann

March 1, 1976

Dr. James R. Allen, D.V.M.
Dept. of Pathology
University of Wisconsin
Madison, Wisconsin 54306

Dear Dr. Allen:

In response to your request for the analysis of chlorodibenzofurans in polychlorinated biphenyls this analysis is the method originally developed by Vos et al (Food Cosmet. Toxicol. 8, 625 (1970)). We have attempted to use this and other methods to measure chlorodibenzofurans in PCB's. Our experiments have included repeated analyses of PCB's to which known amounts of chlorodibenzofurans have been added. We have achieved incomplete and variable recoveries because of incomplete separation of the dibenzofurans from the PCB's, especially for di-, tri-, and tetrachlorodibenzofurans. Bowes et al (Nature 256, 305 (1975)) also observed incomplete separation of lower chlorodibenzofurans from PCB's. Until a more accurate and reproducible procedure is available, we are unable to obtain reliable information on the chlorodibenzofuran content of PCB mixtures.

Therefore, we are returning the samples obtained from you without testing the same since it is our opinion any results would be inconclusive.

Sincerely,

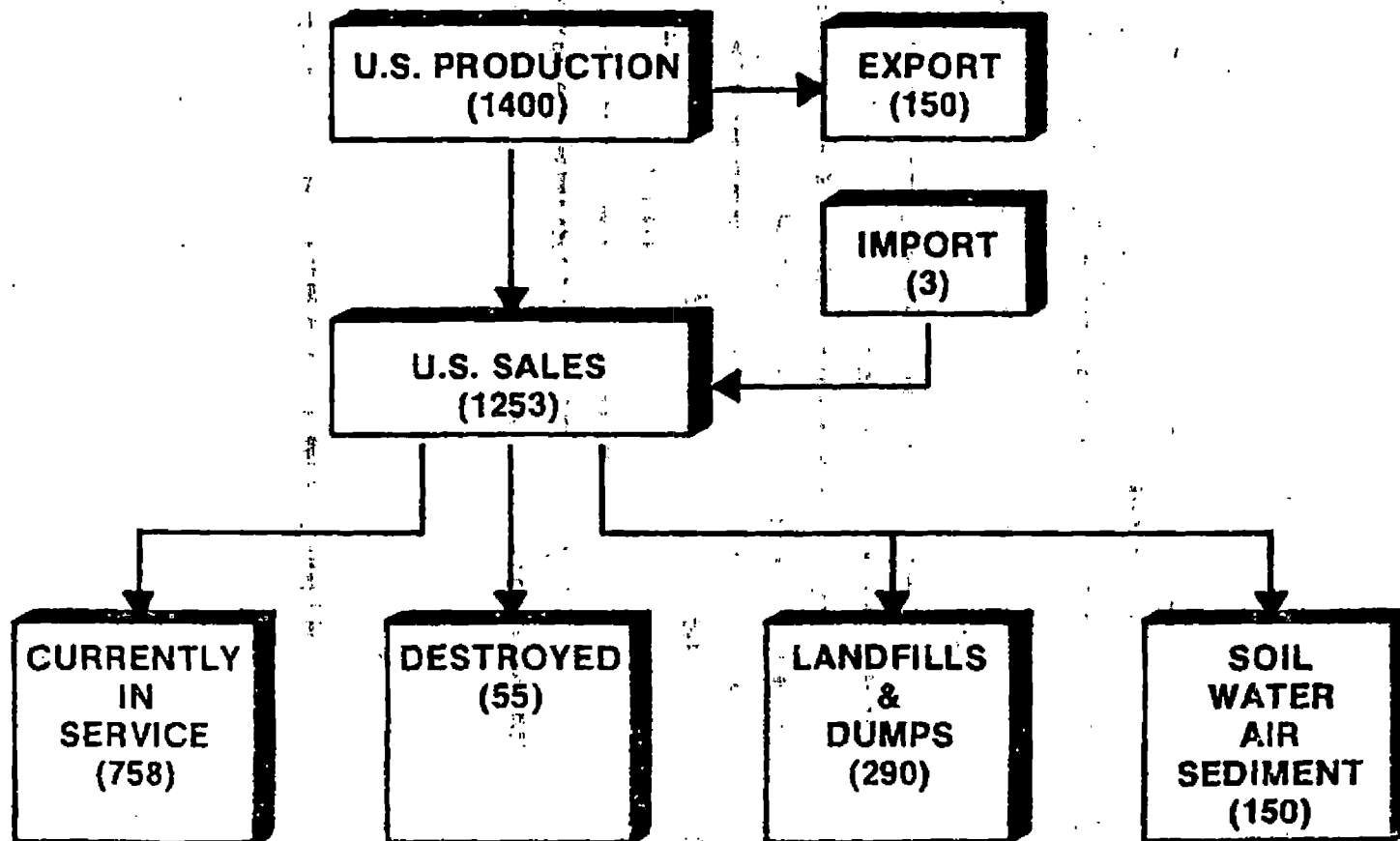
J. Coleman Weber
Manager, Product Acceptability
Specialty Chemicals Division

bb

NEV 036241

PCB PRODUCTION

1930 — 1975
(MILLIONS OF POUNDS)



NEV 036242

USES OF PCB

NEV 036243

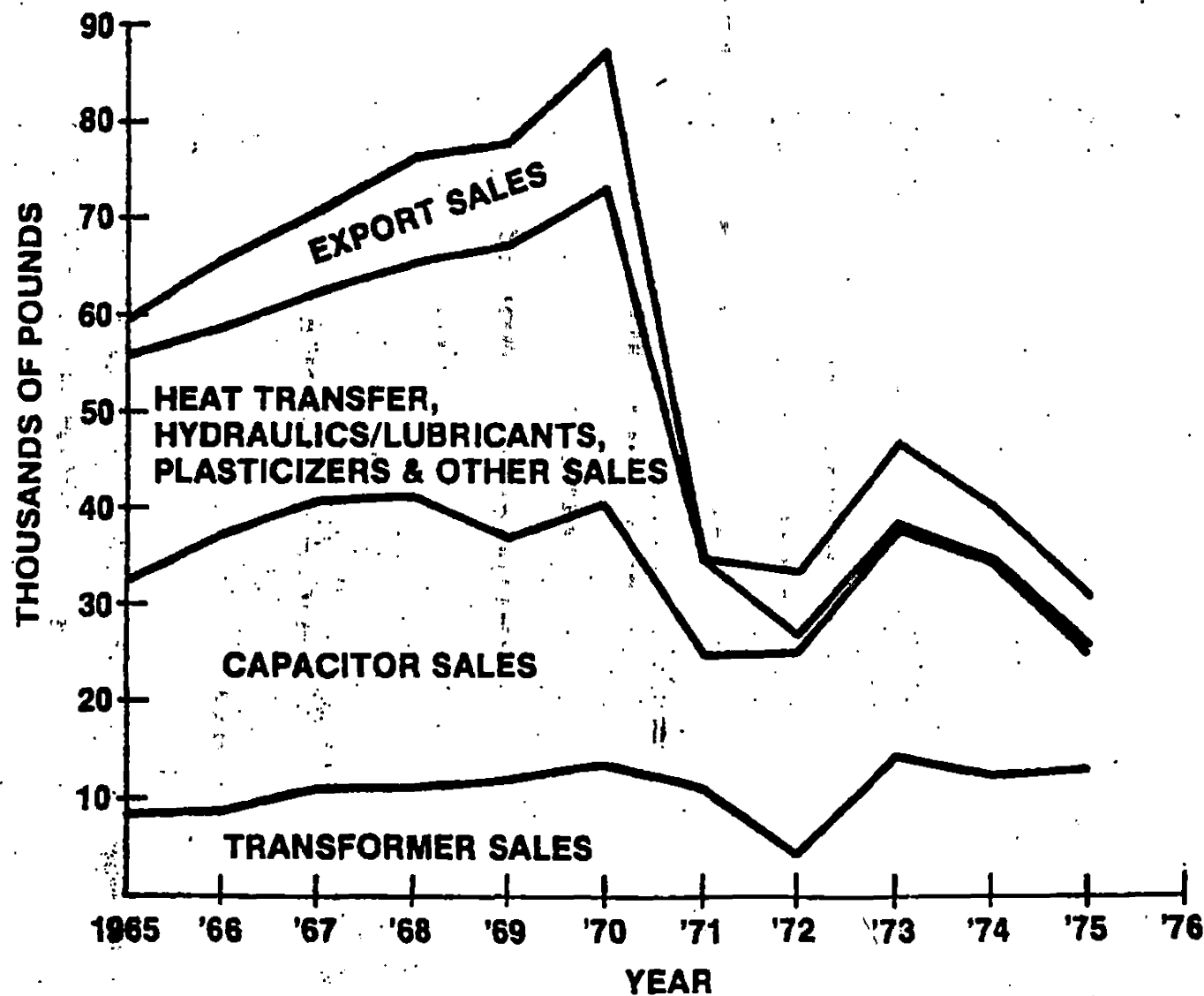
CURRENT

- **ELECTRICAL TRANSFORMER (LARGE)**
- **ELECTRICAL CAPACITOR (LARGE & SMALL)**
- **RECYCLED PAPER (CONTAMINANT)**
- **INVESTMENT CASTING (IMPORT)**

DISCONTINUED

- **HEAT TRANSFER FLUID**
- **HYDRAULIC FLUID**
- **LUBRICANT & CUTTING OIL**
- **PLASTICIZER**
- **ADHESIVE**
- **WAX EXTENDER**
- **PESTICIDE EXTENDER**
- **INK**
- **SEALANT & CAULKING COMPOUND**
- **PAPER COATING**

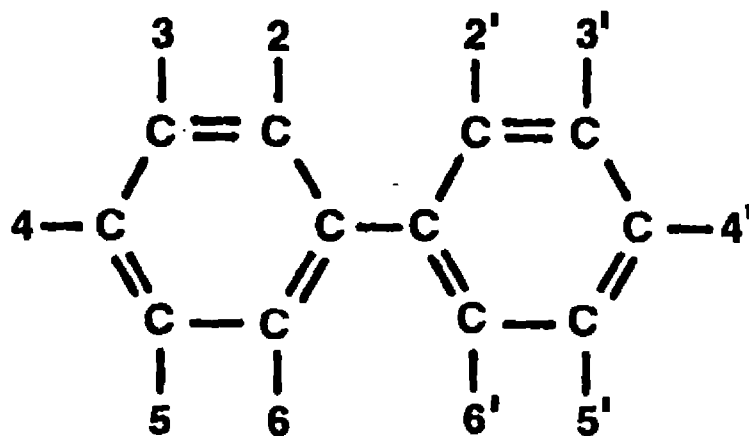
PCB SALES



NEV 036244

PCB—CHEMISTRY

POLYCHLORINATED BIPHENYL



CHLORINATION FROM $O(C_{12}H_{10}) \longrightarrow 10(C_{12}Cl_{10})$

TOXICITY — VARIES BY NUMBER & POSITION OF CHLORINES

PERSISTENCE — 4 CHLORINES & UP

DECOMPOSITION PRODUCTS

DIBENZOFURAN

HYDROXYLATED CHLORINATED BIPHENYL

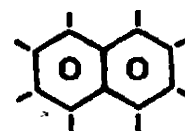
DESIRED PROPERTIES — DIELECTRIC CONSTANT

NON-FLAMMABILITY

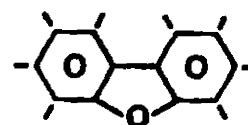
THERMAL CONDUCTIVITY

COMPOUNDS

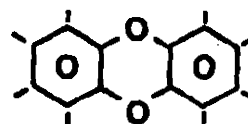
CHLORINATED NAPHTHALENES



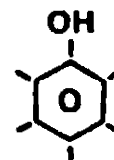
CHLORINATED DIBENZOFURANS



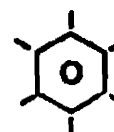
CHLORINATED DIBENZO-p-DIOXINS



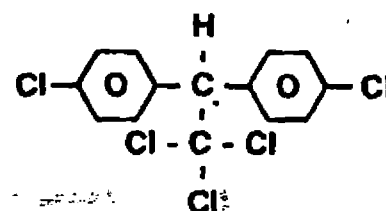
CHLORINATED PHENOLS



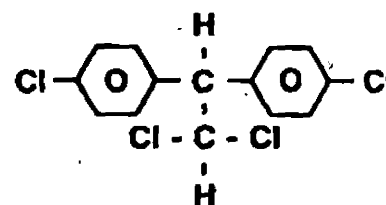
CHLORINATED BENZENES



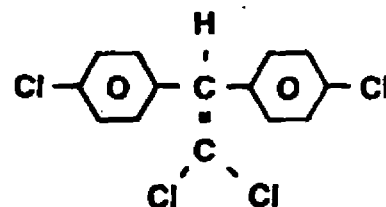
DDT



DDD



DDE



SIGNIFICANT EVENTS—PCB

- 1930 — BEGAN PRODUCTION**
- 1936 — FIRST OCCUPATIONAL EXPOSURE SYMPTOMS**
- 1966 — FOUND IN ENVIRONMENT (SWEDISH DDT WORK)**
- 1968 — JAPANESE RICE OIL CONTAMINATION**
- 1970 — USDA BANS IN PESTICIDES**
- 1971 — FEDERAL TASK FORCE & CONFERENCE**
 - MONSANTO RESTRICTS SALES**
- 1972 — MICH. & WISC. WARNING ON LAKE MICHIGAN FISH**
 - GSA BANS USE IN PAPER**
 - ANSI PUBLISHES HANDLING & DISPOSAL PROCEDURE**
 - USDI BANS USE IN OFFSHORE OIL DRILLING**
- 1973 — FDA TEMPORARY TOLERANCES & RESTRICTIONS**
 - OECD DECISION TO SUPPORT CONTROL**
- 1975 — 2nd NATIONAL CONFERENCE**
 - FISH BAN IN MINN.**
 - EPA ADMINISTRATOR CALLS FOR ELIMINATION FROM COMMERCE**
 - EPA PROPOSES SPILL REGULATIONS**
- 1976 — FISH BANS IN S.C., N.Y., GA., IND.**
 - NY WARNING ON LAKE ONTARIO FISH**
 - MICH., IND., WISC. PASS RESTRICTION LAWS**
 - EPA PROPOSES TOXIC EFFLUENT STANDARD (WATER)**
 - EPA PUBLISHES DISPOSAL GUIDANCE**
 - PROPOSED TSCA BANS FROM COMMERCE IN 2½ YEARS**

PCB AMBIENT AIR LEVELS

24 HOUR SAMPLES

MIAMI, FLA.

JACKSONVILLE, FLA.

FORT COLLINS, COL.

AVERAGE FOR EACH = 100 nanogms/cm

PCB AMBIENT WATER LEVELS

1971-1974

— 4472 WATER SAMPLES

130: RANGE — .1—→4.0 ppb

DETECTION LIMIT — .1—→1. ppb

— 1544 SEDIMENT SAMPLES

1157: RANGE — .1—→13,000 ppb

DETECTION LIMIT — .1—→1. ppb

1973 — 106 INTERSTATE WATER CARRIERS

WINNEBAGO, ILL. — 3 ppb

SELLERBURG, IND. — .1 ppb

1975 — INDUSTRY REPORT

ESCONDIDO, CAL. — .4 ppb

BRIDGEPORT, CONN. — 1. ppb

NEW BEDFORD, MASS. — 2.5 ppb

1976 — 113 WATER SUPPLY SAMPLES

1 PRELIMINARY — 1 ppb

PCB SOIL LEVELS

AGRICULTURAL

1972

- **1,556 SAMPLES**
- **2 DETECTED**

URBAN

1971-1974

- **12 OF 19 METROPOLITAN AREAS**
 - • **1,434 SAMPLES**
 - • **RANGE — .001 —→ 3.33 ppm**
 - • **AVERAGE — .02 ppm**

PCB SEWAGE TREATMENT PLANTS

1973 — MICHIGAN — 58 PLANTS

SLUDGE

- **AVG. 15.6 ppm**
- **HIGH 352 ppm**

EFFLUENTS

- **AVG. 0.52 ppb**
- **HIGH 32 ppb**

1972-73 ONTARIO, CANADA

GUELPH

- **SLUDGE — 5.5 ppm**
- **SOIL — 15-47 ppb (1 APPLICATION)**
- **CORN — 5-95 ppb**

1976

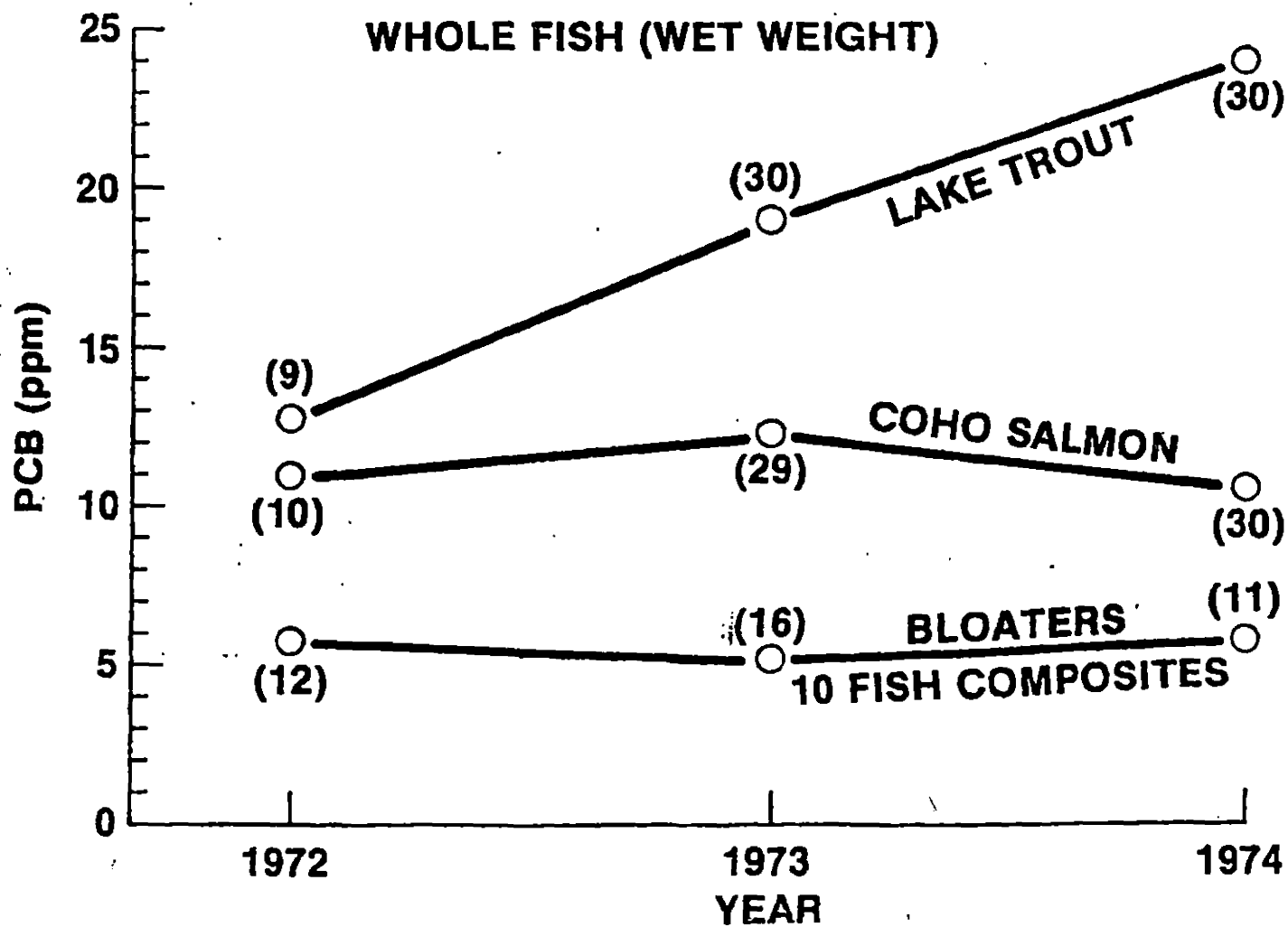
BLOOMINGTON, INDIANA — 200 ppm
NEW BEDFORD, MASS. — 40 ppm
WASHINGTON, D.C. — 4 ppm

PCB—MUNICIPAL LANDFILLS (1976)

STATE	TYPE	PPT
WASHINGTON	GENERAL	15 — LEACHATE
NEBRASKA	GENERAL GENERAL GENERAL SLUDGE & MANURE	41 — LEACHATE WELLS 8 — SURFACE (CREEK) 11 — GROUND WATER 115 — LEACHATE
NEW YORK	GENERAL & SLUDGE GENERAL & SLUDGE	640 — LEACHATE 7 — GROUNDWATER
ARKANSAS	SLUDGE SLUDGE SLUDGE	15 — LEACHATE 17 — SURFACE 8 — GROUNDWATER

PCB—FISH LEVELS

LAKE MICHIGAN



PCB—BIRDS

STARLING MONITORING PROGRAM

NATIONWIDE 1970 — 0.65 ppm

1972 — 0.43 ppm

1974 — 0.12 ppm

MALLARD AND BLACK DUCK MONITORING PROGRAM

ATLANTIC FLYWAY

- **BLACK DUCK — 1969 & 1972 — 1.36 ppm**
- **MALLARD — 1969 & 1972 — 1.29 ppm**

MISSISSIPPI FLYWAY

- **MALLARD — 1969 — 0.44 ppm**
- **MALLARD — 1972 — 0.66 ppm**

CENTRAL & PACIFIC FLYWAYS

- **MALLARD — 1969 — 0.2 ppm**
- **MALLARD — 1972 — 0.1 ppm**

LEVELS IN MAN

RECENT ANALYSIS — 1971-74 ADIPOSE LEVELS

— 6500 SAMPLES — 77% WITH PCB

— — 26% — <1 PPM

— — 44% — 1-2 PPM

— — 7% — >2 PPM

OTHER FINDINGS:

— — SEX DIFFERENCE — NONE

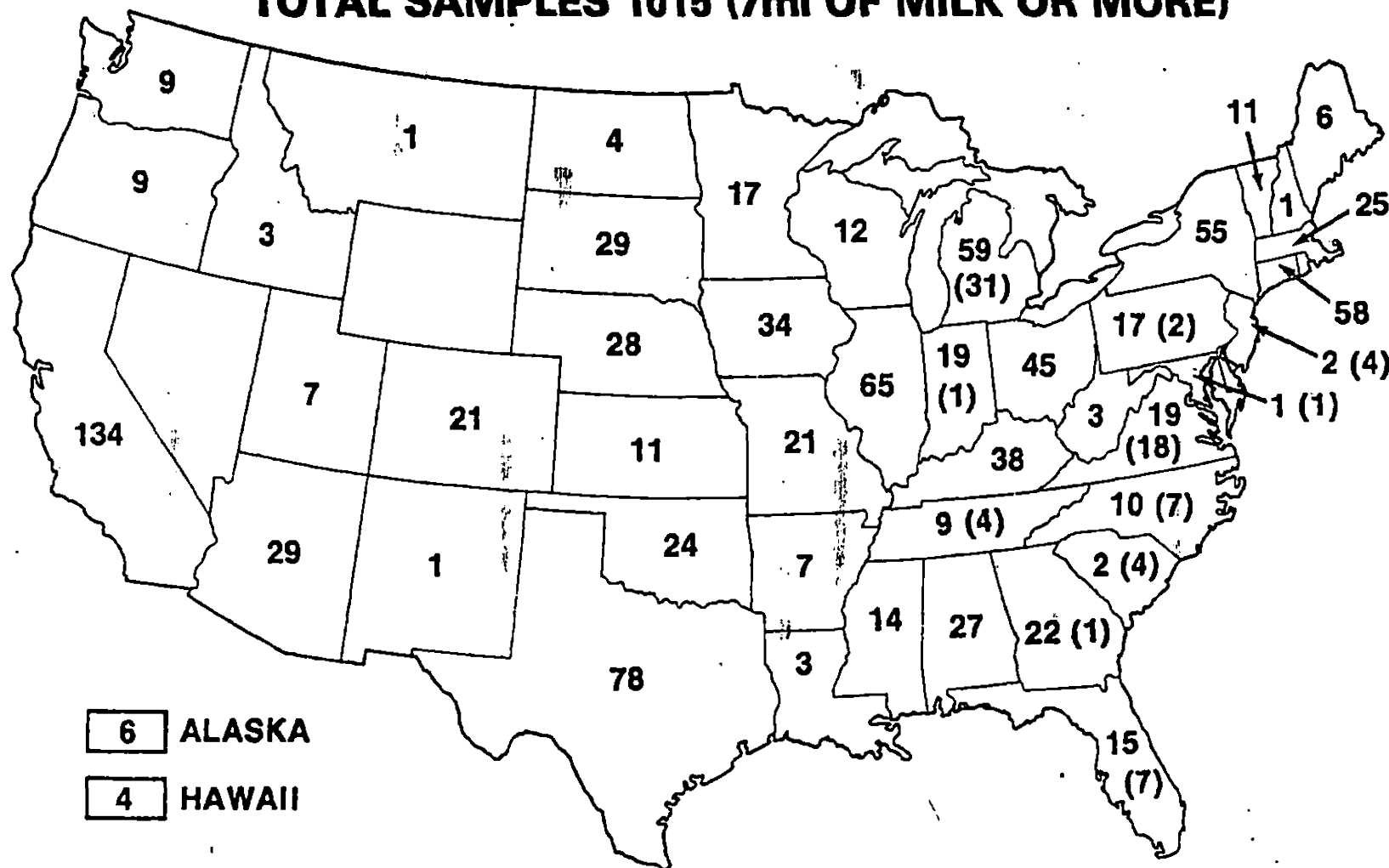
— — AGE DIFFERENCE — INCREASE W AGE

— — RACE DIFFERENCE — NONWHITES HIGHER

MOTHERS' MILK SAMPLE PLAN

COLORADO STATE UNIVERSITY

TOTAL SAMPLES 1015 (7ml OF MILK OR MORE)



6 ALASKA

4 HAWAII

() INDICATES SAMPLES ALREADY ANALYZED

PCB IN MOTHERS' MILK

COLORADO STATE UNIVERSITY DATA

9/76

STATE	NO. SAMPLES	RANGE (PPM)	MEAN (PPM)
VIRGINIA	18	0- 3.90	1.42
NORTH CAROLINA	7	1.24- 4.44	2.64
FLORIDA	7	.22- 4.13	1.79
TENNESSEE	4	.70- 2.38	1.75
SOUTH CAROLINA	4	.25- 4.01	1.96
NEW JERSEY	4	.43- 2.88	1.72
PENNSYLVANIA	2	1.08- 1.50	1.29
GEORGIA	1	.53	—
MARYLAND	1	2.52	—
MICHIGAN	31	.41-10.60	1.88
INDIANA	1	1.92	—
TOTAL	80	0-10,599	1.80

DDE IN MOTHERS' MILK

COLORADO STATE UNIVERSITY DATA

8/76

STATE	NO. SAMPLES	RANGE (PPM)	MEAN (PPM)
VIRGINIA	18	.38-5.15	2.43
NORTH CAROLINA	7	.89-4.32	2.72
FLORIDA	7	1.61-6.43	2.96
TENNESSEE	4	2.04-2.64	2.33
SOUTH CAROLINA	4	1.30-3.42	2.40
NEW JERSEY	4	1.71-2.65	2.01
PENNSYLVANIA	2	4.25-5.60	4.92
GEORGIA	1	2.75	—
MARYLAND	1	1.79	—
MICHIGAN	31	.31-5.81	1.82
INDIANA	1	3.20	—
TOTAL	80	.31-6.43	2.31

036258
NEV

PCB IN MOTHERS' MILK

PREVIOUS DATA

1969 CALIFORNIA	WHOLE MILK	60 ppb MEAN [2.4 ppm FAT]											
1970 SWEDEN	WHOLE MILK	16 ppb MEAN [.64 ppm FAT]											
1971 GERMANY	FAT	3.5 ppm MEAN											
NEW GUINEA TEXAS }	—	NONE DETECTED											
1972 COLORADO	WHOLE MILK	.04—.10 ppm	39 SAMPLES (8 POSITIVE)										
1973-74 ARKANSAS & MISSISSIPPI	WHOLE MILK	TRACE AMOUNTS (<1 ppm)	57 SAMPLES										
ONTARIO: 1969-70 1971-72 1973-74	FAT	<table><tr><td>RANGE</td><td>MEAN</td></tr><tr><td>ppm</td><td>ppm</td></tr><tr><td>.7-1.2</td><td>1.0</td></tr><tr><td>.2-3.0</td><td>1.2</td></tr><tr><td>.1-2.5</td><td>1.2</td></tr></table>	RANGE	MEAN	ppm	ppm	.7-1.2	1.0	.2-3.0	1.2	.1-2.5	1.2	43 SAMPLES 34 SAMPLES 19 SAMPLES
RANGE	MEAN												
ppm	ppm												
.7-1.2	1.0												
.2-3.0	1.2												
.1-2.5	1.2												
1974 NEW BRUNSWICK NOVA SCOTIA	FAT	<table><tr><td>ppm</td><td>MEAN</td></tr><tr><td>1.07-2.1</td><td>1.5</td></tr><tr><td>0-2.4</td><td>1.8</td></tr></table>	ppm	MEAN	1.07-2.1	1.5	0-2.4	1.8	6 SAMPLES 9 SAMPLES				
ppm	MEAN												
1.07-2.1	1.5												
0-2.4	1.8												
1975 JAPAN	WHOLE MILK	<table><tr><td>ppm</td><td>/ppm FAT</td></tr><tr><td>.027 avg.</td><td>[1.0]</td></tr><tr><td>0.1 max.</td><td>[4.0]</td></tr></table>	ppm	/ppm FAT	.027 avg.	[1.0]	0.1 max.	[4.0]	281 SAMPLES (.033 ppm WHOLE TOLERANCE)				
ppm	/ppm FAT												
.027 avg.	[1.0]												
0.1 max.	[4.0]												