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INVESTIGATION OF POSSIBLE POLYCHLORINATED BIPHENYL (PCB) LEAK--ETC(U)
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**UNITED STATES ARMY
ENVIRONMENTAL HYGIENE
AGENCY**

ABERDEEN PROVING GROUND, MD 21010

PESTICIDE SPECIAL STUDY NO. 20-44-0933-79
INVESTIGATION OF POSSIBLE POLYCHLORINATED BIPHENYL (PCB) LEAKAGE
FROM ELECTRICAL TRANSFORMERS DUE TO STORM DAMAGE
WHITE SANDS MISSILE RANGE, NEW MEXICO

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and recommendations were dispatched on 28 August 1978 via message, 281700Z Aug 78. Since PCB levels found in Bldg 1530 were not determined to be hazardous to human health, specific recommendations and corrective measures were not required.

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DEPARTMENT OF THE ARMY
U S ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010

Dr. Vinopal/bb/584-2177

30 NOV 1978

HSE-RP-MQ/WP

SUBJECT: Pesticide Special Study No. 20-44-0933-79, Investigation of Possible Polychlorinated Biphenyl (PCB) Leakage from Electrical Transformers Due to Storm Damage, White Sands Missile Range, New Mexico, August 1978

Commander
USA Materiel Development and
Readiness Command
ATTN: DRCSG
5001 Eisenhower Avenue
Alexandria, VA 22333

A summary of the pertinent findings and recommendations of the inclosed report follows:

a. Findings.

(1) Results of analyses of environmental samples (i.e., sediment, soil, water, air) collected in and around Building 1530, indicated that the flash flood at WSMR in August 1978 caused very little leakage (with no subsequent movement) of PCB's from transformers housed in the basement of Building 1530.

(2) Detectable levels of Aroclor 1260 (the specific PCB involved in this study) were noted only in a single sediment sample collected from transformer vault room 9A. The level of Aroclor 1260 (124 ppm) noted in the sample was below current EPA standards defining hazardous PCB spills or wastes.


b. Recommendations.

(1) A summary of results, conclusions, and recommendations were dispatched on 28 August 1978 via message, 281700Z Aug 78.

(2) Since PCB levels found in Building 1530 were not determined to be hazardous to human health, specific recommendations and corrective measures were not required.

FOR THE COMMANDER:

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as (10 cy)


ROBERT T. WANGEMANN, Ph.D.
COL, MSC
Director, Radiation and
Environmental Sciences

CF:
HQDA (DASG-PSP)
Cdr, HSC (HSPA-P)
Supt, AHS (HSA-IHE)
Cdr, WSMR (2 cy)
Cdr, WBAMC (2 cy)
C, USAEHA-Rgn Div West
Cdr, TECOM



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DEPARTMENT OF THE ARMY
U S. ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010

PESTICIDE SPECIAL STUDY NO. 20-44-0933-79
INVESTIGATION OF POSSIBLE POLYCHLORINATED BIPHENYL (PCB) LEAKAGE
FROM ELECTRICAL TRANSFORMERS DUE TO STORM DAMAGE
WHITE SANDS MISSILE RANGE, NEW MEXICO
AUGUST 1978

1. AUTHORITY.

- a. AR 40-5, Health and Environment, 25 September 1974.
- b. AR 200-1, Environmental Protection and Enhancement, 20 January 1978.

2. REFERENCES.

- a. Message, 242043Z Aug 78, STEWS-BAFE-F, White Sands Missile Range, NM, subject: Request for Analysis of Samples Possibly Containing Polychlorinated Biphenyls (Askarels).
- b. Message, 281700Z Aug 78, HSE-RP, this Agency, subject as above.
- c. Message, 291730Z Aug 78, HSE-RP, this Agency, subject as above.

3. PURPOSE. To assess the extent and possible impact of leakage of PCB's (Askarels) from electrical transformers as a result of storm damage.

4. GENERAL.

a. Background.

(1) On 23 August 1978 a request was received by this Agency from WSMR for assistance in the analysis and evaluation of environmental samples for polychlorinated biphenyls (Askarels). Analysis of these environmental samples was requested in order to determine the extent and possible impact of leakage of PCB's from two electrical transformers located in Building 1530 at WSMR. Leakage of PCB's from the transformers was suspected as a result of extensive flash flooding which occurred in the basement of Building 1530 from rains received earlier in the week. Before the upper 1st and 2d floors of Building 1530 could be re-occupied and before a full-scale cleanup of the basement area could commence, a determination of the extent of PCB leakage and an evaluation of any resulting PCB health hazards were essential. Due to the important nature of WSMR operations performed in Building 1530, a timely determination as to whether or not the building could be safely re-occupied was urgently required.

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(2) The following types and numbers of environmental samples were collected from within and outside Building 1530:

(a) Seven sediment samples (soil from outside that was washed in during the flooding) from the two transformer vault rooms and other locations in the basement of Building 1530.

(b) Five soil samples collected outside Building 1530 from the general area where flood waters pumped from the basement were discharged.

(c) Three water samples from wells uphill and downhill from Building 1530 and from the tap within the building.

(d) Nine air samples collected from the two transformers vault rooms, other rooms located in the basement, 1st floor and 2d floor of Building 1530 and from a manhole behind Building 1530.

(3) In addition to the environmental samples described above, samples of the actual PCB transformer fluid (Askarel) from the transformers located in vault rooms 57A and 9A were also collected.

b. Sample Extraction and Cleanup.

(1) Air Samples. Due to an unavailability of Florisil®, air samples were collected on charcoal tubes. The charcoal tubes were extracted using a National Institute for Occupational Safety and Health (NIOSH) method designed for PCB extraction from Florisil tubes.¹ To increase detection limits, 2 ml of desorption solvent instead of the 5 ml described in the NIOSH method was used. The front portion and back portion of the charcoal tube were extracted separately. Three replicates each of charcoal tube spiked at 1 µg/tube and 5 µg/tube with Aroclor® 1260 were extracted and analyzed in the same manner as the WSMR air samples to determine PCB extraction efficiency from charcoal tubes. Results of these recovery studies are presented in Appendix A.

(2) Water Samples. The water samples were extracted using an EPA procedure designed for extraction and analysis of PCB's in industrial effluents.² Duplicate water samples (laboratory distilled water) spiked with

¹ NIOSH Manual of Analytical Methods, Vol 3, Second Edition, US Department of Health, Education, and Welfare, NIOSH, Cincinnati, OH, April 1977.

² Method for Polychlorinated Biphenyls (PCB's) in Industrial Effluents, MDQARL Environmental Protection Agency, Cincinnati, OH, 28 November 1973.

® Florisil is a registered trademark of Floridin Company, PO Box 989, Tallahassee, FL.

® Aroclor is a registered trademark of Monsanto Chemical Co., 800 N. Lindberg Boulevard, St Louis, MO.

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Aroclor 1260 at the analytical detection limit of 0.8 ppb were extracted and analyzed in the same manner as the WSMR water samples. Results of these recovery studies are presented in Appendix A.

(3) Soil Samples. Extraction and cleanup procedures for the soil samples were essentially identical to those described in a previous report by this Agency.³ Florisil column elution with the 50 percent ethyl ether (petroleum ether mixture) was not carried out on WSMR soil samples since PCB's do not normally elute in this fraction.

(4) Sediment Samples. Two different extractions and cleanup procedures were employed with the sediment samples depending on the suspected levels of PCB's in the samples.

(a) Those sediment samples suspected as having only moderate levels of PCB's were subject to routine extraction and cleanup procedures which have been described in a previous USAEHA report.³

(b) Those sediment samples suspected of containing possible high levels of PCB's (i.e., samples from transformer vaults 57A and 9A and from areas immediately outside these vault rooms) were processed using a modification of the routine procedures cited in the above paragraph. After extraction of 150 g of sediment with 300 ml of hexane: acetone (3:1) mixture in the routine manner, 2 ml of extract (representing 1 g of sediment) rather than the usual 100 ml (representing 50 g of sediment), was carried through the Florisil column cleanup procedure. The above-described modifications in effect raised the PCB analytical detection limit fiftyfold.

(c) As is the case of the soil samples, a 50 percent ethyl ether/petroleum ether Florisil elution was not performed with any of the sediment samples.

(5) PCB Transformer Fluid. These samples were tested in the same manner as technical standards. Twenty milligrams of PCB transformer fluid was weighed into a 100 ml volumetric flask and diluted to volume with benzene. The solution was then serially diluted with isooctane to the approximate PCB electron-capture detection working range (i.e., 200 to 400 pg/ μ l).

c. Sample Analysis and Quantitation. PCB determinations and quantitations on all samples were made by gas-liquid chromatography using electron-capture detection. Instruments used, analysis parameters used, and quantitation techniques employed were basically similar to those described in a previous USAEHA report.³

³ Pesticide Monitoring Annual Report No. 44-0100-78, Department of the Army Pesticide Monitoring Program. Evaluation of Environmental Samples Collected in Calendar Year 1975. Natl. Tech. Inform. Serv. AD-A050 880, 1978, 38 pp.

5. RESULTS AND DISCUSSION.

a. Results of PCB analyses of samples collected from WSMR are shown in Appendix B. Analysis of the transformer fluid from transformers located in vault rooms 9A and 57A indicated that the fluid consisted of approximately 70 percent Aroclor 1260. Based on the analysis of the transformer fluid, it was evident that Aroclor 1260 was the specific PCB of concern in the investigation.

b. Appendix C gives the analytical limits of detectability for Aroclor 1260 in the environmental samples collected from WSMR. The relatively high limits of detectability for Aroclor 1260 in air (i.e., 100-200 $\mu\text{g}/\text{cm}^3$) are attributable to extremely poor (2 percent) recovery efficiency of this Aroclor from charcoal tubes.

c. Positive findings of Aroclor 1260 were noted in only one of the environmental samples analyzed. A sediment sample collected from transformer vault room 9A was the lone positive sample; the sample contained Aroclor 1260 at level of 124 ppm. A level of 124 ppm Aroclor 1260 in an environmental sample such as soil or sediment, although considerably above expected ambient environmental levels, is not considered by current EPA PCB standards to constitute a hazardous spill or waste problem.

d. Not unexpectedly, residues of the insecticides DDT and chlordane were noted in six of the sediment samples and three of the soil samples. The multiresidue methodology used for extraction, cleanup, and analysis of PCB's is also applicable for the determination of residues of a number of insecticides and their metabolites. The residues of p,p'-DDT (with its metabolite p,p'-DDE) and chlordane found in the basement sediment most likely resulted from the washing in of soil from the proximity of Building 1530 which had been previously treated with DDT and chlordane (possible for termite protection). The residues of DDT and chlordane noted in the sediment and soil samples were consistent with levels expected from usual pest management activities.

6. CONCLUSIONS.

a. Based on the results of analyses of the environmental samples collected in and around Building 1530, it can be concluded that the flash flood at WSMR fortunately caused very little leakage (with no subsequent movement) of Aroclor 1260 (the specific PCB involved in this study) from transformers housed in the basement of Building 1530.

b. Detectable levels of Aroclor 1260 were noted only in a single sediment sample collected from transformer vault room 9A. The level of Aroclor 1260 (124 ppm) noted in the sample was below current EPA standards defining hazardous PCB spills or wastes.

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7. RECOMMENDATIONS. A summary of analytical results, conclusions, and recommendations pertaining to the present study was dispatched on 28 August 1978 via reference message 2b.

a. Due to the lack of any significant positive findings regarding PCB leakage from transformers located in Building 1530, specific recommendations and corrective measures were not required. It was suggested as a matter of good practice that the PCB-contaminated sediment (124 ppm Aroclor 1260) from transformer vault room 9A be disposed of in the WSMR sanitary landfill.

b. In the event that the PCB transformer fluid from the transformer located in vault room 9A requires replacement, it is recommended that the Solid Waste Management Division of this Agency be contacted regarding proper disposal procedures for this material.

for Clifford C Rosen
J. HOWARD VINOPAL, Ph.D., R.P.E.
Entomologist
Pest Management & Pesticide
Monitoring Division

APPROVED:

for Clifford C Rosen
JOSEPH T. WHITLAW, JR.
LTC, MSC
Chief, Pest Management and Pesticide
Monitoring Division

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APPENDIX A

RESULTS OF RECOVERY STUDIES FOR EVALUATION OF
EXTRACTION EFFICIENCY OF AROCLOR 1260 FROM
WATER AND AIR SAMPLES

| Type of Sample | Fortification Level (Aroclor 1260) | Percent Recovery (Aroclor 1260) |
|----------------|---------------------------------------|------------------------------------|
| Water | 0.8 ppb | Rep 1 95.3 |
| | | Rep 2 99.5 |
| Air | 1 µg/charcoal tube | Rep 1 2.0 |
| | | Rep 2 2.0 |
| | | Rep 3 2.0 |
| | 5 µg/charcoal tube | Rep 1 2.0 |
| | | Rep 2 2.0 |
| | | Rep 3 2.0 |

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APPENDIX B

RESULTS OF ANALYSIS OF SAMPLES COLLECTED
FROM WHITE SANDS MISSILE RANGE, NEW MEXICO

| USAEHA Sample No. | WSMR Sample Description | Type of Sample | PCB's and/or Pesticides Detected and Their Concentration |
|-------------------------|--|-------------------|---|
| SP 2517 | Sample #1, Transformer Vault Room 9A | Sediment | Aroclor 1260-124.34 ppm |
| 5P 2518 | Sample #2, Area Immediately Outside Transformer Vault Room 9A | Sediment | p,p'-DDE - 0.84 ppm chlordanes - 2.68 ppm |
| 5P 2519 | Sample #3, Transformer Vault Room 57A | Sediment | p,p'-DDE - 0.52 ppm chlordanes - 1.66 ppm |
| 5P 2520 | Sample #4, Area Immediately Outside Transformer Vault Room 57A | Sediment | p,p'-DDE - 0.66 ppm chlordanes - 1.19 ppm |
| SP 2521 | Sample #5, Basement Corridor Outside Room 15 | Sediment | p,p'-DDE - 0.53 ppm p,p'-DDT - 0.92 ppm chlordanes - 2.99 ppm |
| SP 2522 | Sample #6, Basement Corridor Outside Room 28A and B | Sediment | p,p'-DDE - 1.05 ppm p,p'-DDT - 0.52 ppm chlordanes - 3.00 ppm |
| SP 2523 | Sample #7, Basement Corridor Outside Room 50 | Sediment | p,p'-DDE - 0.70 ppm p,p'-DDT - 0.48 ppm chlordanes - 2.82 ppm |
| SP 2524 | Sample #8, Outside Bldg 1530 where water from basement was pumped | Soil | None Detected |
| SP 2525 | Sample #9, Outside Bldg 1530 where water from basement was pumped | Soil | None Detected |
| SP 2526 | Sample #10, Outside Bldg 1530 where water from basement was pumped | Soil | p,p'-DDE - 0.18 ppm p,p'-DDT - 0.14 ppm chlordanes - 0.61 ppm |
| SP 2527 | Sample #11, Outside Bldg 1530 where water from basement was pumped | Soil | p,p'-DDE - 0.02 ppm p,p'-DDT - 0.04 ppm chlordanes - 0.10 ppm |

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| USAEHA Sample No. | WSMR Sample Description | Type of Sample | PCB's and/or Pesticides Detected and Their Concentration |
|-------------------------|--|----------------------|---|
| SP 2528 | Sample #12, Outside Bldg 1530 where water from basement was pumped | Soil | p,p'DDE - 0.37 ppm p,p'-DDT - 0.29 ppm chlordane - 0.53 ppm |
| SP 2529 | Sample #1, Well 21, downhill from Bldg 1530 | Water | None Detected |
| SP 2530 | Sample #2, Well Site, uphill from Bldg 1530 | Water | None Detected |
| SP 2531 | Sample #3, Water Tap Inside Bldg 1530 | Water | None Detected |
| SP 2532 | Transformer Fluid from Trans- former in vault room 9A | Transformer Fluid | Aroclor 1260 - approx. 70.0 % |
| SP 2533 | Transformer Fluid from Trans- former in vault room 57A | Transformer Fluid | Aroclor 1260 - approx. 70.0 % |
| SP 2534 | Sample #1, Basement Corridor Outside Room 15 | Air | None Detected |
| SP 2535 | Sample #2, Basement Corridor Outside Room 50 | Air | None Detected |
| SP 2536 | Sample #3, Basement Corridor Outside Room 28 | Air | None Detected |
| SP 2537 | Sample #4, Transformer Vault Room 9A | Air | None Detected |
| SP 2538 | Sample #5, 1st Floor Corridor Outside Room 174 | Air | None Detected |
| SP 2539 | Sample #6, 1st Floor Corridor Outside Room 118 | Air | None Detected |
| SP 2540 | Sample #7, 2d Floor Corridor Outside Room 248 | Air | None Detected |
| SP 2541 | Sample #8, Manhole Outside Back of Bldg 1530 | Air | Invalid Sample (Collection tube not opened) |
| SP 2542 | Sample #9, Transformer Vault Room 57A | Air | None Detected |

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APPENDIX C

ANALYTICAL LIMITS OF DETECTABILITY FOR AROCLOR 1260
IN ENVIRONMENTAL SAMPLES COLLECTED FROM
WHITE SANDS MISSILE RANGE, NM

| Type of Sample | Limit of Detectability |
|-------------------------------|-----------------------------------|
| Air | 100-200 $\mu\text{g}/\text{cm}^3$ |
| Water | 0.80 ppb |
| Soil | 0.40 ppm |
| Sediment (routine procedure) | 0.40 ppm |
| Sediment (modified procedure) | 20.0 ppm |

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APPENDIX D

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CPT Jeremiah McCarthy, Water Quality Engineering Division

Mr. Stephen Kistner, Water Quality Engineering Division

Dr. John Frick, Solid Waste Management Division

MAJ G. Delaney, Industrial Hygiene Division

Dr. C. Roan, Pest Management and Pesticide Monitoring Division

Mr. John F. Suprock, Pest Management and Pesticide Monitoring Division

Mr. Thomas M. White, Pest Management and Pesticide Monitoring Division

Ms. S. Ehrhardt, Pest Management and Pesticide Monitoring Division