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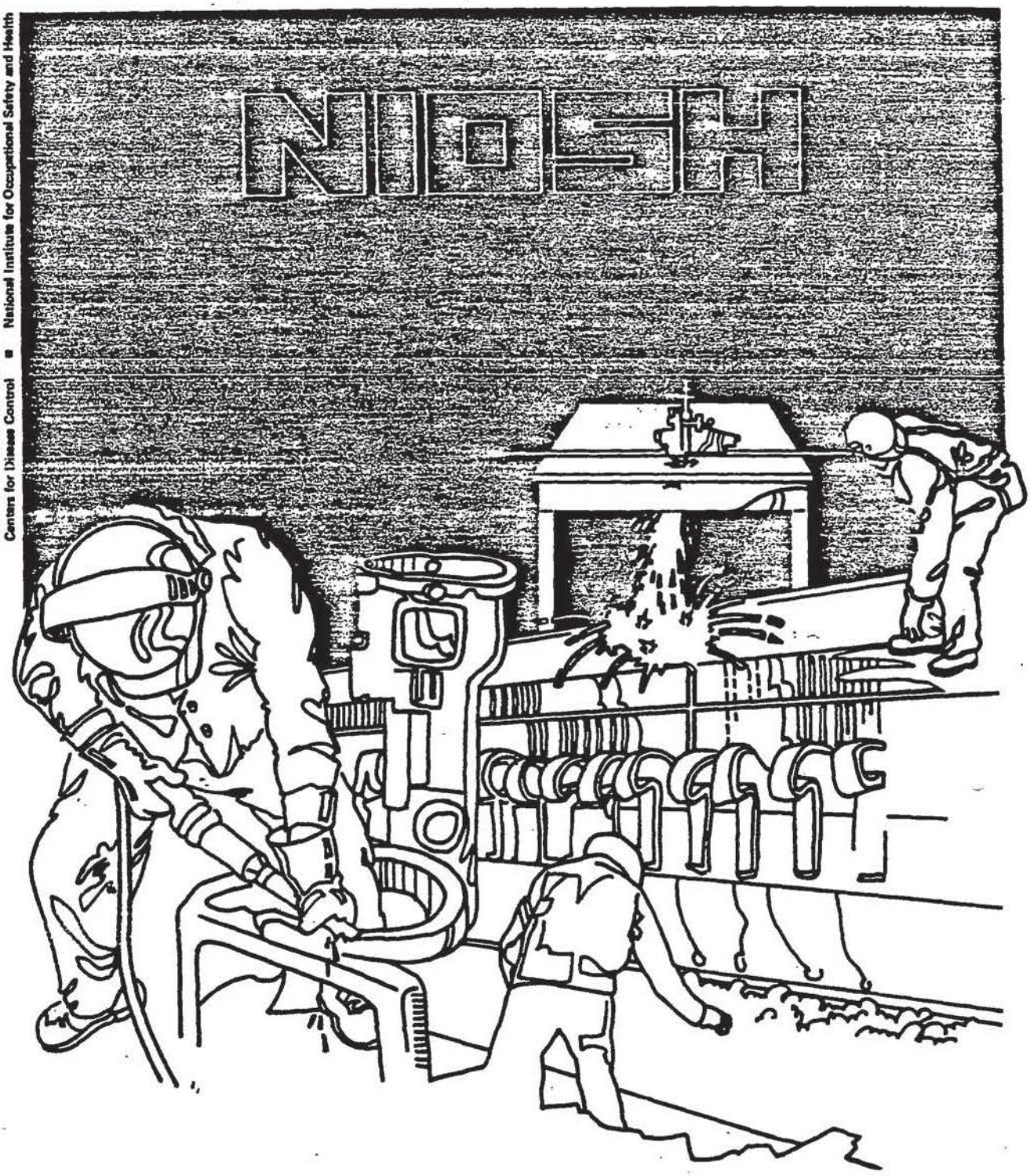

Health Hazard Evaluation Report

HETA 83-424-1403
OZARK NATIONAL SCENIC RIVERWAYS
VAN BUREN, MISSOURI

PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

HETA 83-424-1403
JANUARY 1984
OZARK NATIONAL SCENIC RIVERWAYS
VAN BUREN, MISSOURI

NIOSH INVESTIGATOR:
George A. Carson, Ph.D, CIH

1. SUMMARY

On August 26, 1983, NIOSH was requested to evaluate employee exposure to chlordane at the Ozark National Scenic Riverways, National Park Service, Van Buren, Missouri. In October 1982, 58 government-owned structures in the area had been treated for termites using a pesticide containing chlordane. Persistent odors after the retreatment of one private residence in February of 1983 prompted a request for measurement of air concentrations of chlordane.

During the week of September 26, 1983, 21 area air samples were taken in six buildings, including four private residences owned by the National Park Service and occupied by rangers. Concentrations of chlordane in these samples ranged from .33 to 27. ug/m^3 (micrograms per cubic meter) with levels in 14 of the samples exceeding the 5 ug/m^3 National Research Council's evaluation criteria for residences. Three bulk and three swipe samples showed 1800 ug/g, 920 ug/g, 1200 ug/g, 7.3 ug/$inch^2$, .13 ug/$inch^2$ and .14 ug/$inch^2$ respectively. These were all taken from the residence suspected of having the highest contamination levels.

Based on the environmental measurements made during this investigation, NIOSH concluded that the individuals occupying three residences could be exposed to harmful levels of chlordane if they continue occupancy in these buildings. Specific recommendations for each building investigated are included in this report.

KEYWORDS: SIC 2879 (Pesticides & Agricultural Chemicals), chlordane, private residences

II. INTRODUCTION/BACKGROUND

On August 26, 1983, the National Institute for Occupational Safety and Health (NIOSH) received a request for technical assistance in evaluating employee exposure to chlordane at the Ozark National Scenic Riverways (ONSR), National Park Service, Van Buren, Missouri.

In October 1982, the ONSR contracted with Dixon Termite and Pest Control, Mountain View, Missouri, to have all of their buildings inspected and treated for termites. Approximately 58 buildings required treatment with a pesticide containing chlordane. The chlordane was usually injected into the subsurface. However, some National Park Service employees reported that chlordane was also topically applied to the interior and exterior of some of the buildings.

In February of 1983, during a renovation project, it was discovered that one of the rangers quarters was still infested with termites. The pest control firm was called again to retreat the building. During this second treatment, the exterior soil around the fireplace was saturated and the interior framing around the fireplace was topically misted before the wall board was replaced. The floor joists and sills along the foundation were also topically misted on the interior of the building as well as holes were made in the concrete floor slab to inject the pesticide.

The current residents of these quarters became very concerned about the situation because of the strong and persistent odors. They contacted the National Park Service Midwest Regional Safety Officer, the Environmental Protection Agency, Region VII Office, and the Missouri Department of Agriculture asking for assistance in resolving the situation. On August 1, 1983, a Pesticide Inspector for the Missouri Department of Agriculture visited the residence and took some samples. To date, neither the residents nor ONSR have received the results of these tests.

The family living in the quarters (Building #305) consisted of a husband, a wife, and a daughter born in early 1983. The husband and wife are in their middle thirties. The husband had a blood sample drawn for chlordane analysis in July of 1983 and the wife and daughter had a blood sample drawn in August of 1983. Chlordane was detected in the husband's blood at a value of less that one ng/ml. No chlordane was detected in the blood samples drawn from the wife and daughter. These results prompted the National Park Services to request NIOSH assistance in evaluating this situation.

III. METHODS

During the week of September 26, 1983, the NIOSH investigator visited the ONSR District Office in Van Buren, Missouri. This office is responsible for the maintenance of all Park Service buildings in this southeastern Missouri area. These include over 100 structures including visitor centers, rental cabins, small picnic shelters, restroom facilities, and private residences.

After interviewing office personnel and maintenance staff and visiting several buildings, six were selected for study. The six were selected as being representative of the type of structure in the area as well as representative of the spectrum of time and pesticide application methods used.

Area air samples were collected in the buildings over the two-day sampling period. These samples were collected using MSA Model G pumps calibrated at approximately one liter per minute. Both ORBO 42 and ORBO 43 (chromosorb 102) sorbent tubes manufactured by Supelco were used as the collecting medium. Several side-by-side samples were taken using both kinds of tubes for sampling method comparison purposes. NIOSH analytical method S-278 was used. The sorbent in the tubes was desorbed in toluene and analyzed on a Tracor 222 gas chromatograph equipped with an electron capture detector. The technique resulted in a limit of detection (LOD) of 0.05 ug/sample.

Bulk samples of soil and wood chips were collected from Building #305 and placed in 20ml sealed vials. Swipe samples were also collected from inside Building #305 using the Whatman #50 smear tabs dry and sampling in one six inch stroke.

IV. DESCRIPTION OF BUILDINGS SAMPLED

A. Building #305 - Building #305 is a government-owned, private residence currently occupied and located in the Powder Mill area. It is a single story structure with a full basement and has 2400 ft^2 of living space. The building is of the frame construction type with poured concrete basement walls. The residence is heated with a wood stove located in the basement using natural convection to deliver heat to the living space. The building was treated in October of 1982 using a subsurface application technique. After finding live termites in the walls, the walls and basement area around the fireplace were retreated in February of 1983. During this treatment, the chlordane mixture was misted inside the basement on the floor joists and sills, as well as being poured into holes drilled in the basement slab and on top of the ground on the exterior of the building.

B. Building #416 - Building #416 is a government-owned, private residence currently occupied and located in the Big Springs area. It is a single story structure with a full basement and has 1960 ft^2 of living space. The building is of the frame construction type with layed up basement walls of limestone and mortar. This building was not treated in October of 1982. The last time it was treated with chlordane is unknown.

C. Building #419 - Building #419 serves as a garage and storage facility for the Big Springs maintenance area. It is a single story structure with some loft storage and doors across the entire front. The building encompasses 2359 ft^2 and is built on a slab as a frame construction type structure. A carpentry shop is located in one end of the building. This building was treated in October of 1982. The chlordane was applied to the interior and exterior of the building adjacent to the foundation or slab.

D. Building #436 - Building #436 is a government-owned, private residence currently vacant and located in the Mill Creek area. It is a single story structure with no basement and has 1997 ft^2 of living space. The building is of the frame construction type. This building was treated in October of 1982 and has been closed up and vacant since the treatment.

E. Building #502 - Building #502 serves as the maintenance shop for the Alley Springs area. It is a single story structure with some loft storage and large doors across most of the front. The building encompasses 2500 ft^2 and is of the frame construction type built on a slab. The maintenance foreman's office is located in one end of this building. This building was treated in October of 1982. The chlordane was applied to the interior and exteriors of the building adjacent to the foundation or slab.

F. Building #504 - Building #504 is a government-owned, private residence currently occupied and located in the Alley Springs area. It is a single story structure with a full basement and has 1550 ft^2 of living space. The building is of the frame construction type with layed-up basement walls of limestone and mortar. This building was treated in October of 1982.

V. EVALUATION CRITERIA

Chlordane is a member of a group of chemical compounds generically termed "chlorinated cyclodienes." For its use as an insecticide, and especially as a termiticide, it is available in pure and technical grades. Pure chlordane is a viscous, colorless, odorless liquid with chemical and physical properties as follows:

Chemical name:	1,2,4,5,6,7,8,8-Octachloro-4, 7-methano-3a, 4, 7, 7a-tetra hydroindane
Molecular weight:	410
Molecular formula:	$C_{10}H_6Cl_8$
Boiling point: (760 mm Hg)	(Decomposes); 175 C (347 F) at 2mm Hg
Physical state:	Colorless, odorless, viscous liquid
Vapor pressure:	0.00001 mm Hg (at 20°C)
Specific gravity:	1.57 - 1.67
Soluble:	In many organic solvents
Solubility in Water:	9 ug/L
Reactivity:	1. Conditions contributing to instability: Temperatures above 200 C (392 F) cause decomposition with formation of chlorine and hydrogen chloride gases.
	2. Incompatibilities: Contact with strong oxidizers may cause fires and explosions.
	3. Hazardous decomposition products: Toxic gases and vapors (such as hydrogen chloride, chlorine, phosgene, and carbon monoxide) may be released when chlordane decomposes.
	4. Special precautions: Chlordane will attack some forms of plastics, rubber, and coatings.

Acute or chronic exposure of humans to chlordane can produce central nervous system symptoms characterized by headache, blurred vision, dizziness, involuntary muscle movements, tremors, and seizures. Data on chronic exposure at low airborne concentrations are limited. A recent epidemiologic study of workers producing chlordane suggested that exposure has no long-term effects. However, because of shortcomings in the study and the suggestion of a trend in standard mortality ratios for deaths due to cancer in workers with increasing length of employment, more complete data is needed before firm conclusions can be reached with regard to the long-term human-health risks of chlordane.

The cyclodienes are deposited in body fat, with biologic retention half-life on the order of days to several weeks. Because these compounds are all persistent in the environment, they can be effective as termiticides for up to 20 years after application.

The source of criteria used to assess air concentrations of chlordane was developed by the National Research Council's Committee on Toxicology in 1979 in responding to the Department of Defense's request for a military housing guideline. Quoting from their report:

"Guidelines for Airborne Exposure

The airborne exposure limits suggested here are intended to provide guidance in estimating the health risks of the pesticides in military housing. These are not standards like those suggested by the Occupational Safety and Health Administration, and they do not guarantee absolute safety. Given the available data and the fact that under conditions of prolonged exposure of families in military housing there may be persons, such as young children, who in general are more susceptible to environmental insults, the Committee concluded that it could not determine a level of exposure to any of the termiticides below which there would be no biologic effects.

The exposure limits were derived on the basis of health considerations and reflect the combined judgment of the Committee members; the feasibility of achieving the suggested airborne concentrations was not taken into account. However, every effort should be made to minimize exposure to the greatest extent feasible.

Chlordane. The Committee on Toxicology in 1979 suggested an interim guideline for airborne chlordane in military housing of 5 ug/m^3. This was derived pragmatically on the basis of known concentrations of chlordane in military housing, a review of reported health complaints, and consideration of data from long-term animal-feeding studies. After an extensive review of the available literature on chlordane, and in the absence of definitive information on the health risks in humans and animals associated with various degrees of exposure to airborne chlordane, the Committee concludes that there are no new data that justify a change in the guideline of 5 ug/m^3 and suggests that it continue to be used. Because of the shortcomings of current data and in view of the Committee's request that more definitive data be developed, the airborne concentration of 5 ug/m^3 should be regarded as an interim guideline for exposures not exceeding 3 yr. This 3-yr period is suggested with the expectation that it will provide adequate time for the needed health data to begin developing."

Therefore an air level of 5 ug/m^3 will be used in evaluating the airborne chlordane concentration data.

VI. RESULTS AND DISCUSSION

The results of the 21 air samples are shown in TABLE I. Bulk and swipe samples from Building #305 are shown in TABLE II. The air concentrations ranged from 0.35 to 27. ug/m^3. Six sets of paired samples were collected using a large (ORBO #42) and a small (ORBO #43) sorbent tube at three sampling sites. These paired and repeated samples were taken for two reasons. The first and most important reason was to make sure that any level measured was in fact representative of the true concentration and the second was to get some idea as to whether both types of sampling tubes collected similar amounts of chlordane. These results are shown in TABLE III. Pairs designated 1, 3, 4, and 5 show fairly consistent results. Sample #22 of Pair #2 and Sample #30 of Pair #6 appear to be outliers. However, these outliers would not influence the data to the point that it would alter the conclusions to be drawn in a later section of this report. The results shown in TABLE III indicate that the sampling and analytical techniques used were valid and that the concentrations shown in TABLE I are in fact true estimations of the chlordane concentrations at the various sampling sites.

A. Building #305, Private Residence - Nine air samples were taken from three sites within Building #305. These levels ranged from 5.1 ug/m^3 to 27. ug/m^3 (TABLE I). All of these air levels exceed the 5 ug/m^3 criteria. The general area around and under the fireplace was the focus of intensive treatment because of the presence of live termites after the initial treatment in October of 1982. The air levels adjacent to the fireplace foundation in the shallow basement (crawl space) were the highest inside the residence and averaged 23. ug/m^3. Bulk samples in this general area and the soil next to the exterior structure of the fireplace ranged from 920 ug/g to 1800 ug/g as shown in TABLE II. The general basement area, which is under most of the residence, and the area adjacent to the shallow basement area showed an air level of 17. ug/m^3 for just one sample. The air samples taken in the area of the fireplace mantle in the living quarters averaged 8.1 ug/m^3. Swipe samples in the living space adjacent to the fireplace and on a window sill showed 7.3 ug/$inch^2$ and .13 ug/$inch^2$ respectively. A floor joist in the crawl space showed a level of .14 ug/$inch^2$. All of these results indicate that the air, soil, and some surfaces in and around the building are presently contaminated at a level that make the building unacceptable for occupancy.

B. Building #416, Private Residence - Two air samples were taken from the general basement area in this building. They were taken on the two sampling days and were 3.4 ug/m^3 and 3.1 ug/m^3 (TABLE I). Both of these levels are below the 5 ug/m^3 criteria. Since these levels should continue to become lower because of the natural degradation of chlordane, we see no need to vacate this residence.

C. Building #419, Garage & Storage Facility, Big Springs - Two air samples were taken from the carpenter shop area at one end of this facility. They were taken on the two consecutive sampling days and showed chlordane air concentration levels of .33 ug/m^3 and 2.2 ug/m^3 (TABLE I). These levels are less than the 5 ug/m^3 criteria and are in a facility that is very open and only intermittantly occupied. Therefore, we have no reason to suspect that the air levels will exceed 5 ug/m^3 in this facility and normal use should continue.

D. Building #436, Private Residence - Four air samples were taken from the kitchen area of this vacant residence. On the first day of sampling we were unable to return to the building late in the evening so the pumps ran until the batteries were dead. Therefore, the volume sampled was estimated to be one liter. The two air levels were then calculated to be 12. ug/m^3 and 14. ug/m^3. On the second day of sampling, the levels obtained were 15. ug/m^3 and 1.0 ug/m^3 (TABLE I). Based on the first day's results and the one sample on the second day, we think the 1.0 ug/m^3 level is not valid. Since three of the four levels exceeded the 5 ug/m^3 criteria, we think the airborne concentration in this building is such that it should not be occupied at this time.

E. Building #502, Maintenance Shop, Alley Springs - Two air samples were taken from the general shop area of this facility. They showed 3.0 ug/m^3 and 2.2 ug/m^3 on the two sampling days (TABLE I). Since these levels did not exceed the 5 ug/m^3 criteria and the facility is used intermittently, we do not think there are any situations where airborne concentrations of chlordane would exceed the 5 ug/m^3 criteria.

F. Building #504, Private Residence - Two air samples were taken from the general basement area in this occupied residence. They were collected on the two consecutive sampling days with the sampler sitting on a workbench in the center of the basement. The air concentration levels of chlordane were 22. ug/m^3 and 25. ug/m^3 (TABLE I). These levels are at least four times the 5 ug/m^3 criteria and therefore we believe the air concentration of chlordane in this residence is at an unacceptable level.

IX. RECOMMENDATIONS

The recommendations discussed in this section are based on information contained in the report prepared by the National Research Council's Committee on Toxicology, the document entitled "Pesticides for Termite Control", prepared by the New York State Department of Health's Bureau of Toxic Substances Assessment and the NIOSH/OSHA Occupational Health Guideline for Chlordane.

A. Buildings

Building #305, Private Residence - This building should be vacated as soon as feasible. Since there is no proven chemical method for decontamination of household goods, we recommend that all hard surfaces of items to be removed be wet wiped using a mild detergent. Dishes, kitchen utensils, and similar items should be washed before removal. Care should be taken so that the goods are not recontaminated. Clothes, drapes, and other fabrics should be washed or dry cleaned as appropriate. These items may be place in plastic bags to prevent recontamination. We are not aware of any techniques to effectively decontaminate building structures or soil. We suggest that the building be secured and that some windows or doors be left slightly open to allow natural ventilation. After some period of time (years) the building could be resampled and, if levels are below 5 ugm/m^3, the building could be reoccupied.

Building #416, Private Residence - There should be no problem with continued use of this building.

Building #419, Garage & Storage Facility, Big Springs - There should be no problem with continued use of this building.

Building #436, Private Residence - This building should remain vacant until air levels are below 5 ugm/m^3.

Building #502, Maintenance Shop, Alley Springs - There should be no problem with continued use of this facility.

Building #504, Private Residence - Same recommendation as Section IX., paragraph A.

B. Decontamination

When decontamination is used to reduce chlordane environmental levels in structures, the primary site of the contamination must be located and either removed or isolated. Next, the secondary sites, those sites where the chlordane was tracked or carried as a vapor or dust particle, can then be decontaminated to reduce chlordane environmental levels. Primary site decontamination may involve a wide variety of positive actions. These could range all the way from excavating contaminated soil hot spots to painting walls to seal the chlordane within the pores of the construction material.

The personal protective equipment for workers carrying out primary site decontamination will depend on the specific activity being undertaken and each situation should be evaluated by an industrial hygienist. For instance, if highly contaminated soil is going to be excavated, workers who carry out the operation should wear protective coveralls, impervious gloves, boots, eye protection, and air-purifying respirators, gear similar to EPA's Level "C" protection. At the other extreme, painting walls to seal up surface pores of construction materials may require only coveralls and gloves. In either case, professional industrial hygiene input must be obtained.

Personal protective equipment for secondary site decontamination presents a different scenario. In these instances, the contamination levels are generally lower and less protection is required. Coveralls are still recommended because of potential contact with contaminated surfaces and latex gloves should always be worn when washing walls, dishes, or other household goods.

C. Additional Studies

Although the six buildings selected for study were chosen to represent the spectrum of the different facilities and pesticide application techniques, the results obtained raise several questions concerning this judgement. Consequently, we think it would be in the best interest of all parties involved to conduct a more thorough investigation of potential chlordane exposures in all of the 58 treated facilities. This information is necessary in order that the National Park Service can make informed decisions on continued occupancy and the decontamination of each building. NIOSH is prepared to conduct this study in cooperation with the National Park Service.

Although an aggressive comprehensive medical surveillance program for individuals exposed in any of the buildings is not recommended at this time, we continue to investigate methodologies that would result in a more definitive and integrated index of worker exposure. The most feasible of these methodologies to date appears to be the collection of blood from individuals for chlordane analysis. More formal recommendations will be developed as we gather more information.

D. Future Termite Control

We strongly recommend that the Ozark National Scenic Riverways discontinue the use of chlordane for control of termites. When future contracts are entered into with pesticide applicators, the material to be used should be specified and each application should be monitored to assure that the applicator is complying with the provisions of his license.

X. AUTHORSHIP AND ACKNOWLEDGEMENTS

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XI. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from the NIOSH Publications Office at the above address.

Copies of the report have been sent to:

A. Superintendent, Ozark National Scenic Riverways
B. Midwest Regional Safety Officer, National Park Service
C. Missouri Department of Agriculture
D. Missouri Division of Health
E. Public Health Service Officer, National Park Service
F. NIOSH, Region VII
G. OSHA, Region VII

For purposes of informing the affected employees, a copy of this report shall be posted in a prominent place, accessible to the employees, for a period of thirty (30) calendar days.

XII. REFERENCES

1. National Research Council's Committee on Toxicology, "An Assessment of the Health Risks of Seven Pesticides used for Termite Control", National Academy Press, August 1982.

2. New York State Department of Health, Bureau of Toxic Substance Assessment. "Pesticides for Termite Control", October 1983.

3. NIOSH/OSHA, "Occupational Health Guidelines for Chemical Hazards", NIOSH Pub. # 81-123, January 1981.

TABLE I

Chlordane Air Concentration Results

Ozark National Scenic Riverways
Van Buren, Missouri
HETA 83-424

Sample #	Bldg #	Location	Date	Time	Vol	Lab Result	Conc
					m3	ug/sample	ug/m3
1	416	Private residence, basement	9-27-83	0805-1622	0.50	1.7	3.4
2	419	Garage and Storage Facility	9-27-83	0812-1628	0.57	.19	.33
3	305	Private residence, shallow basement area under fireplace (crawl space)	9-27-83	0952-1812	0.56	15.	27.
4	305	Private residence, fireplace mantle	9-27-83	0955-1810	0.57	3.4	6.0
5	305	Private residence, fireplace mantle	9-27-83	0955-1810	0.47	2.4	5.1
6	305	Private residence, basement under fireplace	9-27-83	0952-1812	0.55	14.	25.
7	502	Alley Springs Maintenance shop	9-27-83	1028-1730	0.40	1.2	3.
8	504	Private residence, basement area	9-27-83	1040-1735	0.44	9.6	22.
9*	436	Vacant residence, kitchen area	9-27-83	1140-	1	12.	12.
10*	436	Vacant Residence, kitchen area	9-27-83	1140-	1	14.	14.
16		Blank	9-27-83			less than 0.05	
17		Blank	9-27-83			less than 0.05	
18		Blank	9-27-83			less than 0.05	

*Pump ran until batteries expired volume estimated

TABLE I (continued)

Sample #	Bldg #	Location	Date	Time	Vol	Lab Result	Conc
20	419	Garage and Storage facility	9-28-83	0808-1620	0.54	1.2	2.2
21	416	Private residence	9-28-83	0750-1625	0.54	1.7	3.1
22	305	Private residence, fireplace mantle	9-28-83	0907-1758	0.58	8.	14.
23	305	Private residence, fireplace mantle	9-28-83	0907-1758	0.50	3.7	7.4
24	305	Private residence, crawl space	9-28-83	0912-1754	0.57	12.	21.
25	305	Private residence, crawl space	9-28-83	0912-1754	0.57	11.	19.
26	305	Private residence, general basement area	9-28-83	0917-1801	0.42	7.	17.
27	504	Private residence	9-28-83	0957-1722	0.47	12.	25.
28	502	Alley Springs Maintenance shop	9-28-83	1000-1720	0.46	.99	2.2
29	436	Vacant residence	9-28-83	1110-1910	0.53	8.	15.
30	436	Vacant residence	9-28-83	1110-1910	0.53	.55	1.
32		Blank	9-28-83			less than 0.05	
33		Blank	9-28-83			less than 0.05	
34		Blank	9-28-83			less than 0.05	

TABLE II

Chlordane Bulk Concentration Results

Ozark National Scenic Riverways
Van Buren, Missouri
HETA 83-424

Sample #	Bldg #	Location	Date	Type	Result
11	305	Private residence, fireplace mantle	9-27-83	Swipe sample	7.3 ug/inch^2
12	305	Private residence, windowsill	9-27-83	Swipe sample	.13 ug/inch^2
13	305	Private residence, floor joist in basement	9-27-83	Swipe sample	.14 ug/inch^2
14	305	Soil sample outside by fireplace wall	9-27-83	Bulk	1800 ug/g
15	305	Surface dirt scrapings in crawl space	9-27-83	Bulk	920 ug/g
31	305	Private residence, termite eaten wood from crawl space	9-28-83	Bulk	1200 ug/g

TABLE III

Paired and Repeat Sample Results

Chlordane Air Concentrations
Ozark National Scenic Riverways
Van Buren, Missouri
HETA 83-424

Building Location	Pair #	Date	Sample #	Tube type	Concentration
	1	9-27-83	5	43	5.1
305		9-27-83	4	42	6.0
Fireplace					
Mantle	2	9-28-83	23	43	7.4
		9-28-83	22	42	14.
	3	9-27-83	6	43	25.
305		9-27-83	3	42	27.
Crawl					
Space	4	9-28-83	25	43	19.
		9-28-83	24	42	21.
	5	9-27-83	10	43	14.
436		9-27-83	9	42	12.
Kitchen					
	6	9-28-83	30	43	1.0
		9-28-83	29	42	15.

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