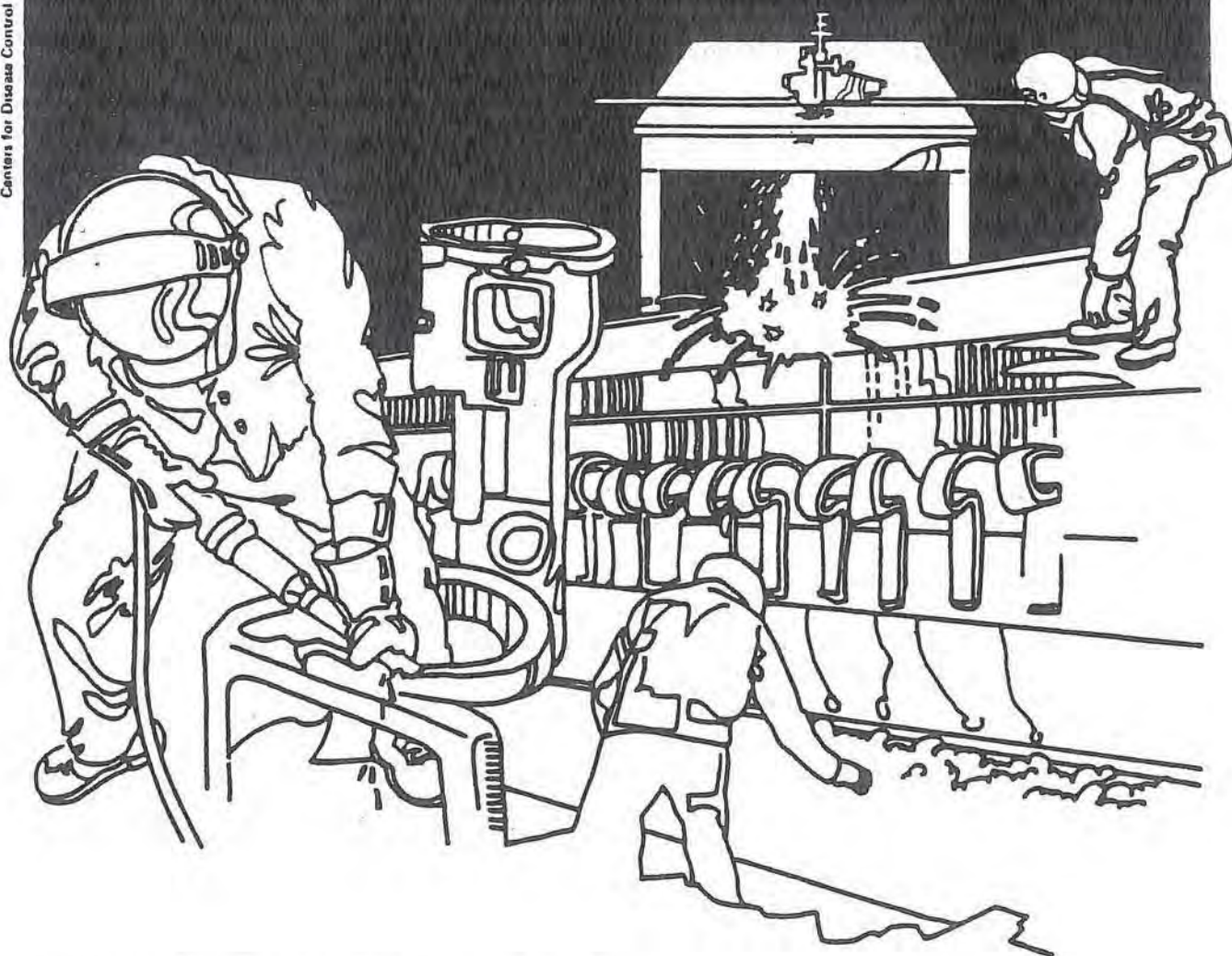


NIOSH



Health Hazard Evaluation Report

HETA 83-085-1757
EVERGLADES NATIONAL PARK
EVERGLADES, FLORIDA

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.

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EVERGLADES NATIONAL PARK
EVERGLADES, FLORIDA

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I. SUMMARY

On December 20, 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request from the National Park Service for a health hazard evaluation to evaluate occupational exposure to N,N-diethyl-m-toluamide (DEET) among workers employed at Everglades National Park in Southern Florida. DEET is an active ingredient in all the commonly used topical insect (mosquito) repellents applied to skin and clothing by workers in the Park.

A questionnaire was administered to 143 workers in the Park the week of August 20, 1984. Workers were divided into low, medium, and high exposure groups based on reported use of DEET. A group of 20 workers submitted urine for measurement of DEET concentration. There was good correlation between self-assessment of repellent use on the day of exposure and urinary DEET measurements. After adjusting for other factors which might cause adverse health effects, it was found that more highly exposed workers had significantly higher prevalence of insomnia, muscle cramping, symptoms of mood disturbances, skin rash or blisters, and difficulty starting or stopping the urinary stream.

A follow-up survey was performed in 1985, in which 77 workers were evaluated, pre-exposure (March) and post-exposure (August) by means of questionnaires regarding daily exposure to DEET, as well as neurotoxic symptoms, sleep disturbances, and "psychic distress." Neurobehavioral functions were also assessed using several tests of central nervous system performance. There was some evidence of an increase in daytime sleepiness with increasing exposure to DEET. In addition, a positive association was noted between prevalence of "psychic distress" symptoms and exposure to DEET; this association was statistically significant for symptoms associated with "impaired cognitive function." No other significant increase in the reporting of neurotoxic symptoms was found. In addition, although some parameters of the neurobehavioral tests demonstrated a trend toward less improvement (decreased performance) between March and August with increasing exposure, none of these results approached statistical significance.

Because of the reports of neurologic and dermatologic symptoms in the initial study, and the association between exposure to DEET and increase in sleep disturbances and symptoms compatible with "impaired cognitive function," NIOSH investigators have determined that N,N-diethyl-m-toluamide may pose a health threat to persons using it in large quantities. Therefore, we believe that it would be prudent to limit DEET use to the amount that is absolutely necessary.

KEY WORDS: N,N-diethyl-m-toluamide, diethyltoluamide, DEET, insect repellent, neurobehavioral effects, sleep disturbance, urinary dysfunction

II. INTRODUCTION

On December 20, 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request from the National Park Service, Department of the Interior, to investigate the possibility of adverse health effects resulting from exposure to the topical insect repellent N,N-diethyl-m-toluamide (DEET) among employees of Everglades National Park, Florida.

Management had been asked by concerned employees for information about the effects of frequent application of mosquito repellent during the period from April through October, when there is heavy mosquito infestation. (As many as 135 mosquito landings per minute on an exposed forearm were recorded in 1984 by the staff at Everglades National Park.) There were anecdotal reports that some employees had an abnormal sensation of decreased sweating and episodes of confusion, which they thought might be related to excessive repellent use.

Because there were few mosquitos during the summer (peak mosquito season) of 1983, and comparatively less use of insect repellent than usual, NIOSH postponed its initial evaluation until the week of August 20, 1984. Based on the results of the first survey, a follow-up prospective evaluation of neurobehavioral function was conducted during the weeks of March 25, 1985 (before the mosquito season) and August 19, 1985 (during heavy mosquito infestation). The results of the first survey were presented to Everglades National Park staff in a meeting August 23, 1985 (at the conclusion of the study).

III. BACKGROUND

Approximately 155 workers are employed at the Everglades National Park in southern Florida. During periods of mosquito infestation, from April through October, workers must rely on heavy use of insect repellents as their principal form of protection. DEET is the principal active ingredient in the insect repellents used in the park. Concentrations in the various preparations used range from 15% to 75% in spray-on formulations and from 30% to 100% in lotions (Table 1).

IV. METHODS AND MATERIALS

A. INITIAL SURVEY

All available employees of the Park Service were asked to complete a self-administered questionnaire (Appendix A) during the week of August 20-23, 1984. (Some workers were in remote locations in the park and were not available to participate). The questionnaire included a translation of a questionnaire widely used epidemiologically and clinically in the neurobehavioral evaluation of solvent exposed workers

in Sweden ("Swedish 16" Questionnaire).¹ This questionnaire evaluates eight categories of neurologic symptoms: affect lability, forgetfulness, absentmindedness, fatigue, sexual interest, paresthesias, gross neuropathic symptoms and vegetative" symptoms. In addition, workers were questioned about recent history of a variety of other neurologic symptoms, including confusion, lightheadedness, gait disturbances, motor weakness, headache, and muscle cramping; about mucous membrane or respiratory irritation, and about personal habits that might cause the symptoms of interest.

To assess health effects, we examined the reported prevalence of symptoms considered separately, as well as neurologic symptom groupings used in evaluating responses to the "Swedish 16" neurobehavioral questionnaire. This procedure was followed both because there were few affirmative responses for some individual questions and to reduce the number of comparisons to be made.

Based on use reported in the initial questionnaire, we calculated for each worker an average dermal weekly DEET exposure for August:

$$\begin{aligned} \text{Grams of DEET} &= \text{Reported Volume of Repellant Used (gms)} \\ &\times \text{Percent DEET in Repellant} \end{aligned}$$

As aerosol products are commonly applied to clothing as well as to skin, the exposure to aerosol products was arbitrarily assigned a value of 1/3 of the total amount of DEET applied. This was considered reasonable in view of decreased likelihood of absorbing DEET applied to clothing compared with DEET applied to skin. Inhalation during aerosol application to clothing or skin and ingestion of DEET from handling food or cigarettes after application to skin may also contribute to body burden of DEET.

In order to relate reported exposure to prevalence of symptoms, we stratified participants based on the weekly dermal exposure index into three groups of approximately equal size. We then compared the prevalence among exposure groups. Based on their reported use of DEET during the month of the survey, workers were classified as low exposed (non-users); medium exposed (regular users applying up to 4.25 grams per week to the skin, as estimated by the exposure index described above); or high exposed (workers who apply more than 4.25 grams of DEET to the skin in an average week). (Table 2).

Differences among exposure groups were initially characterized by a χ^2 test on a 2 x 3 table. A p value <.10 was considered of interest. To investigate the relationship between symptoms and exposure to DEET, the statistical technique of logistic regression² was used, in which the logarithm of the odds of an affirmative response to a symptom question or group was modeled as a linear function of

exposure (represented as two variables signifying medium and high exposure) and a variety of potential confounders (age, alcohol intake, etc.). A forward stepwise regression procedure was used in which the simplest model which included the exposure variable was determined. Where the prevalence of a symptom group was significantly increased among exposed workers, prevalence of each symptom question in the group was analyzed to see if it was responsible for differences among different exposure groups.

To assess absorption of DEET, we field tested a method for measuring concentrations of DEET in urine. Twenty workers submitted 4-hour midweek (12 p.m. to 4 p.m.) urine collections for analysis of urinary DEET concentrations by high pressure liquid chromatography (HPLC) using reverse phase C-8 columns. The carrier solvent was 3:2 (v/v) methanol-water at 3 ml/minute. A description of sample preparation follows:

- 1) Extract 1 ml of urine three times with 5 ml of ethyl ether.
- 2) Combine the three extracts.
- 3) Evaporate the combined extracts to approximately 0.2 ml.
- 4) Dilute the 0.2 ml to exactly 1 ml with methanol.
- 5) Inject 20 ul of the above solution (step 4) into the HPLC for analysis.

The limit of quantitation was 0.5 ug/ml.

Total urinary DEET collection was compared with reported DEET application during the day of the collection. A separate brief questionnaire was administered to assess dermal application of DEET for the day of urine collection:

$$\text{Estimated Exposure Index} = \text{Number of Applications of Repellant} \\ \times \text{Percent DEET in Repellant}$$

Again, calculated exposure from aerosol products was multiplied by one third.

V. EVALUATION CRITERIA

An estimated 38% of all Americans use insect repellents every year, the majority of which contain N,N-diethyl-m-toluamide (DEET).³ DEET was marketed as an insect repellent in 1957.⁴ As such, it has not been required to meet current Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) requirements for toxicological testing, which would apply were it to be newly marketed today. In a 1980 Pesticide Registration Standard for DEET, the U.S. Environmental Protection Agency (EPA) noted that there has been incomplete assessment of the dermatologic, oncogenic, mutagenic, and reproductive effects and of the absorption

and metabolism of DEET, and advised the manufacturers that appropriate studies should be undertaken.³ No guidelines regarding exposure to DEET have yet been issued by OSHA, ACGIH, or NIOSH.

The toxicity of DEET has recently been extensively reviewed by Robbins and Cherniack.⁵ A number of animal studies demonstrate that DEET penetrates the skin partially (9-56%)⁶⁻¹⁰ and is absorbed into the circulatory system rapidly. Absorption ranges from 10-60%.¹¹⁻¹³ Renal excretion of DEET is initially rapid, but only about one half of the absorbed dose is excreted after five days.^{11,13} Deposition in the skin has been documented.^{8,10,11,14} Although the results are not consistent, several studies reveal concentrations of DEET isomers subsequent to uptake in a variety of tissues, including the liver, kidney, bladder, brain, and lacrimal gland.^{10,15} Placental transfer of DEET has also been documented.^{11,16}

Rats exposed acutely and chronically to inhaled DEET at doses lower than those at which any other toxic sign could be detected demonstrated impaired performance on a neurobehavioral test battery measuring balance, tactile sensation, endurance, learning, and activity.¹⁷ The authors suggest that, in practice, human dermal absorption could equal doses at which neurobehavioral effects were seen in animals. Overt toxic signs in animals with higher acute exposure included tremor, lack of energy, and difficulties with gait and balance. Other animal studies have demonstrated disruption of motor coordination or gait abnormalities (Hardin, Goad, and Chrislip, unpublished data). Irritant skin effects, ranging from mild erythema and skin dryness to severe dermatosis, have been reported in a several animal species.^{3,4,18,19}

The literature regarding adverse effects of DEET in humans is limited primarily to a small number of case reports. There have been six case reports of toxic encephalopathy in children which were associated with heavy exposure to DEET.²⁰⁻²⁴ Three cases had a fatal outcome. There is a report of a woman experiencing anaphylaxis (angioedema, hypotension, and asthma) as a result of exposure to DEET.²⁵ Patch testing provided evidence of an immunologic response to DEET.

Reports of skin symptoms in the literature are limited. A previous survey of users reported occasional contact dermatitis, aggravation of pre-existing acne, conjunctivitis, and burning eyes in people exposed to 40% DEET in a field trial.²⁶ There have also been outbreaks of skin eruptions in the antecubital fossae in military personnel exposed to 50% and to 75% DEET.^{27,28} These rashes have resulted, in some cases, in ulceration and permanent scarring. Patch testing of adults with low concentrations of DEET (7.5% and 15%) has been reported to result in a low incidence of dermal irritation.³ Contact urticaria has been documented anecdotally.²⁹

VI. RESULTS

A. INITIAL SURVEY

Of approximately 160 available employees of the Park Service, 143 (90%) agreed to participate in the initial study performed in August 1984. Of these, 99 regularly used DEET in their work. The distribution of the calculated weekly exposures are shown in Table 3. Mean weekly estimated dermal application (14.6 gm) was considerably greater than median weekly application (2.6 gm) because of especially heavy use by some workers, especially those in the Southern part of the park, where mosquito infestation is greatest. We estimate that 5% of the workers who regularly use insect repellents apply 66.3 grams or more to the skin weekly.

Follow-up telephone calls to some of the heaviest users revealed that some workers pour government issue (75% DEET) repellent into a squirt bottle and then spray it onto their skin and clothes. This unusual practice accounts for some of the extremely high usage reported. Of the 20 workers who submitted urine specimens, 8 applied DEET and 12 applied no repellent on the day of collection. One of these 12 workers had an interfering peak in the DEET solution spectrum, which was reported as possibly representing DEET. The same interfering peak was seen in urine from (unexposed) laboratory controls allowed to stand at room temperature. The false positive report probably resulted from delay in freezing the sample after collection in the field. Eleven of the 12 workers had no measurable DEET in the urine. Figure 1 is a graph of 4-hour urinary DEET excretion plotted against calculated dermal exposure index (for the 8 workers who reported applying repellent) on the day of the urine collection. The estimated exposure levels for the day correlate reasonably well to DEET levels in urine collected after four hours of exposure ($r=.70$, $p=.04$). The calculated exposure is a crude estimate, and the number of samples is small, but these results suggest that reported exposure is a good assessment of actual absorption of parent compound.

Potential confounders to the symptom-exposure group associations are presented in Table 4. They were included in the logistic regression model used to control for confounding. Demographic characteristics (age, race, sex, education) are not statistically significantly different among the three exposure groups. Workers in the high exposure group were slightly more likely to consume one or more drinks weekly than unexposed workers. They were also more likely to apply pesticides on the job or to have had a previous job with chemical exposure. The possibility of overreporting of symptoms among the high exposure group was controlled for by including as a potential confounder the response to a set of symptoms unlikely to be affected by DEET exposure (shaking chills and gastrointestinal symptoms). We also controlled for demographic characteristics.

For the eight categories of symptoms evaluated by the "Swedish 16" neurobehavioral questionnaire, only those symptoms related to lability of affect (which included questions about irritability and about depression) were different across exposure groups (Table 5). There was a clearly increasing prevalence with increasing exposure. A grouping of 12 other neurologic symptoms experienced within the previous 2 weeks (and not included in the previously validated questionnaire) was more prevalent among exposed workers (Table 6). When individual symptoms from this group were evaluated, the prevalences of difficulty falling asleep or staying asleep, muscle cramping, and urinary hesitancy (that is, difficulty starting or stopping the urinary stream) appeared to demonstrate a dose to response relationship. Other symptoms which were more prevalent among the high exposed group included rashes and chest pain or wheezing.

Figure 2 shows the odds ratios by exposure group for the symptoms determined to be of interest in the original chi square analysis ($p < .10$ by chi square or Fisher's exact test) for all symptoms except urinary hesitancy ($p = .11$ by Fisher's exact test), which demonstrated a marked trend and was analyzed further using the logistic regression procedure). Odds ratios were derived from the logistic regression for the symptoms of interest after correcting for confounding. Affective symptoms were significantly increased among highly exposed workers ($p = .049$). After controlling for potential confounders, the other 12 neurologic symptoms as a group were still significantly increased among both medium and highly exposed workers (Table 6). Of those 12 symptoms, insomnia ($p < .01$), muscle cramps ($p < .05$), and urinary hesitancy ($p < .10$) are associated with DEET exposure.

In answer to an open ended question asking for any health symptoms related by the participant to use of insect repellent, 36 (25%) of 143 workers reported some health effect which was attributed anecdotally to the use of DEET. There were a variety of reports of rashes, skin or mucous membrane irritation, and transient numb or burning lips (Table 7). There were three reports of neurologic symptoms. One worker has noted dizziness, disorientation, and difficulty concentrating after wearing a jacket soaked in DEET to repel mosquitos. Another reported dizziness after applying repellents heavily to the skin. A third worker reported episodes of headaches and nausea, which develop shortly after applying DEET containing repellents which last for approximately 10 minutes. There was not a statistically significantly increased difference between exposed and less exposed workers in the prevalence of dizziness, disorientation, headache, difficulty concentrating or nausea in the study.

(IV. METHODS AND MATERIALS)

B. FOLLOW-UP SURVEYS

Five questionnaires were administered during the follow-up surveys in March and August 1985. These included (a) an exposure questionnaire; (b) the symptom questionnaire from the initial survey, with additional questions to identify recent urinary tract symptoms; (c) a previously validated questionnaire was used for evaluation of peripheral neuropathy³⁰ (a-c: Appendix B); (d) a "short form" of a questionnaire validated against the multiple sleep latency test (D. Blumstein, Stanford Sleep Center, unpublished manuscript) (Appendix C); and (e) the "psychic distress" questionnaire, validated against psychiatric interviews in a previously published population study used for evaluation of affective and other psychological symptoms.^{31,32} (Appendix D)

The multiple sleep latency questionnaire assessed daytime sleepiness as an index of sleep disturbance and insomnia. In experimental subjects, daytime complaints of sleepiness increase approximately linearly as nocturnal sleep is reduced.³³

In the "psychic distress" questionnaire, symptoms are presented on cards, one symptom per card. Symptoms were sorted by the worker into those which have not bothered him (her) within the previous six months (scored 0); those which bothered him "not much" (scored 1); and those which bothered him "a lot" (scored 2). The questions were grouped into four dimensions of psychic distress: mood depression (questions 1-4), anergia (questions 5-8), mood anxiety (questions 9-14), and impaired cognitive functioning (questions 15-17). Scores were summed for all symptoms in the group, and a score greater than one-half the number of symptoms in each dimension was considered "high" for that grouping of symptoms. For each group of symptoms, anyone who moved from a "low" score to a "high" score over the course of the follow-up study was of interest. The distribution of these individuals by exposure was evaluated statistically.

We evaluated the development of symptoms between the March and August administrations of the questionnaire. A person with a change of concern was anyone who did not have any symptoms in March, and who then developed one or more symptoms by August. For questions which were scaled (e.g., questions relating to peripheral neuropathic symptoms questions 54-64 in the follow-up questionnaire), a change of interest included any reported increase in frequency (or severity) of a symptom between March and August. As in the initial survey, differences among the categorized exposure groups were initially characterized and tabulated. However, in the follow up study, any grouping of symptoms developed by 10 or more individuals was analyzed statistically using a logistic regression procedure. The log odds of developing the symptom

was modeled for the 24-hour exposure index, both as a continuous measurement and categorized into the median of the three groups (in separate procedures). Included in the model was a variable indicating the difference between the number of stimulant drinks (coffee or tea) consumed during the previous 24-hours in March and August; a variable for the difference between number of alcoholic drinks consumed during the preceding 24-hours; and a variable used to indicate possible overreporting in August of symptoms also used in the initial 1984 survey (development of gastrointestinal symptoms or shaking chills). The first order interaction of stimulant drinks and alcohol consumption with exposure was also included. A forward stepwise procedure considered interaction and possible overreporting; then the procedure was repeated to include exposure and significant interaction terms (including the corresponding main effects) to evaluate other potentially confounding effects.

A test battery designed to measure neuroperformance was administered in both March and August 1985. Three other tests (tremor, vision, "tongue twisters") were administered but, because of technical problems, were not analyzed. The following tests were administered in the order listed: a gait test, a balance test, a short-term memory scanning test^{34,35}, and the Santa Ana Test of manual dexterity. Descriptions of these tests are in Appendix E.

The questionnaire evaluating exposure was modified slightly in order to quantify exposure more precisely. An index of DEET exposure during the previous 24 hours prior to the August examination was calculated:

Daily Exposure grams = #grams in formulation x (1/# days to use up one container) x (weighting for application to clothing versus skin*).

* Weights for dermal exposure (according to self-reported use) as follows:

Applied exclusively to skin=1
Applied mostly to skin, but also to clothing=.75
Applied equally to skin and clothing=.5
Applied mostly to clothing=.25
Applied exclusively to clothing=.10

This exposure was summed for all formulations used at the time of the survey. An estimated daily exposure was calculated for use over the previous 24 hours and also for reported use over the previous 2 weeks. Because the two indices correlated very well and because a similar twenty-four hour index had been shown to correlate well with urinary DEET excretion during the 1984 survey, only the 24 hour index was used in subsequent statistical evaluation of questionnaire and neuroperformance results.

The neurobehavioral tests were evaluated using multiple regression techniques, modeling the outcome (change in neuroperformance score from March to August) as a function of exposure, change in number of stimulant drinks, in number of alcoholic drinks per week, and two indicator variables of a change in use of medications likely to affect the central nervous system (one variable to indicate starting use in the interim and one variable to indicate those individuals who stopped using such a medication). The first order interaction of exposure with each of the other main effects was also considered in an initial model which included all main effects. A subsequent model included exposure and significant interaction terms and allowed for evaluation of other potential confounders. For each neuroperformance test, both a forward and backward stepwise regression procedure were done, and both the categorical exposure and continuous exposure indices were used as independent variables (in separate procedures).

(VI. RESULTS)

B. FOLLOW-UP SURVEYS

1. Participation

The initial follow up survey was conducted during the week of March 25, 1985, a period when there are few mosquitoes in the park, and when workers were not using repellent. One hundred and ten of the participants in the initial survey were selected for follow-up evaluation. The employees were selected starting from the two extremes of reported exposure during 1984, and excluding those in the middle. Four of these employees refused to participate in the follow-up survey; 21 workers had left the park service or were on vacation, sick leave or in remote areas during the time of our March 1985 visit. In addition, three new participants were selected randomly from among workers at the site during periods when space was available, as a result of scheduled workers postponing or refusing participation. At the time of the re-evaluation in August 1985, 70 of the 90 participants (78%) from March were available for interview. There were no refusals in August 1985.

Among the 77 employees who participated in both parts of the follow-up survey, there were 24 (31%) women and 53 (69%) men; 4 (5%) blacks and 73 (95%) whites. The mean age was 41, ranging from 24 to 61 years.

2. Exposure

The frequency distribution of the 24-hour exposure index is shown in Table 8. Because it is highly skewed, we also calculated a categorized exposure index using the median of three groupings as

the exposure for each individual in the group: Non-users (N=25) used 0 grams daily; medium exposed (N=32) used 0.01 grams to 0.52 grams daily (median 0.15 grams); highly exposed (N=20) used 0.71 grams to 69.38 grams daily (median 1.86 grams).

Urine was collected for assessment of DEET absorption. However, because of delays in processing, the results would have been unreliable.

3. Symptoms

The tabulated results for the neurologic symptoms which had been also asked previously in the first survey (August 1984) are presented in Tables 9 and 10. (Also included are additional symptoms regarding muscle cramping and urinary tract symptoms). There were few people who developed these symptoms and for no symptom were the differences significant (by chi square or Fisher's exact test or adjusted using the logistic regression procedure).

Non-neurologic symptoms also did not change significantly between March and August, as demonstrated in Table 11.

Persons who developed peripheral neuropathic symptoms of concern included not only those individuals who first developed a symptom, but also anyone whose symptoms became more frequent between March and August. The distribution of such individuals by exposure group is shown in Table 12. No symptom of peripheral neuropathy was significantly more prevalent among the exposed workers.

Individuals who developed worsening of symptoms of daytime sleepiness (questions scaled 1-5) or who first developed a symptom during the period of the study are shown in Table 13. The change in subjective daytime sleepiness is statistically significant across the exposure groups. The trend of increasing subjective complaints is significant in the logistic regression analysis for the categorized exposure variable ($p=.02$), but not for the continuous exposure index. There is also a significant increase in the proportion reporting having fallen asleep at a performance ($p=.02$ for the categorical predictor, but $p>.05$ for the continuous exposure index in the logistic regression model).

Possible psychologic effects of DEET were evaluated using the "psychic distress questionnaire." Table 14 shows the distribution of individuals whose score moved from low to high over the course of the survey on each of the symptom dimensions. There was an upward trend in prevalence with increasing exposure in all categories, but this trend only achieved statistical significance for symptoms compatible with "impaired cognitive function" ($p=.006$ and $p=.004$ for the continuous and categorical exposure index,

respectively, in the logistic regression model). There was a significant interaction between increasing alcohol consumption and DEET exposure in the model when using the continuous exposure index as the independent predictor.

4. Neurobehavioral Test Results

The mean change in score for the various neuroperformance tests between March and August (August score minus March score) are presented in Table 15.

GAIT TEST:

All groups showed improvement in scores on the gait test over the course of the study. However, there is no trend suggestive of an association between exposure and performance.

BALANCE TEST:

There is a trend toward poorer performance (less improvement between March and August among the more heavily exposed workers. However, this trend is not statistically significant in the regression model for either the categorical or independent exposure variable.

MEMORY SCANNING TEST:

a. Slope (memory scanning time):

All groups showed improvement in this measure of short-term memory retrieval; however, there is no evidence of an association of performance with exposure.

b. Intercept (psychomotor response time):

There is no evidence of a dose-response relationship with this parameter. Although the mean change in performance in the unexposed and the high exposed groups were an improvement of 7 msec and a decline of 49 msec, respectively, the difference was not significant ($p=.30$).

c. Errors:

For optimal interpretability of the results, the memory scanning test should be performed with few or no errors. However, especially with no practice trials, as in this study, errors do occur. There is a trend toward a smaller degree of improvement between March and August with increasing exposure, but, the association with exposure was not statistically significant.

SANTA ANA DEXTERITY TEST:

There is no relationship between exposure to DEET and change in performance over the course of the study.

VII. DISCUSSION

In the initial 1984 cross-sectional questionnaire survey, the increase in prevalence of insomnia among heavily exposed workers was of high statistical significance. This association remains significant after controlling for possible confounders. Furthermore, there was one unsolicited anecdotal report from the spouse of a participant in the survey that insomnia resulted from heavy use of DEET. In addition, there was an exposure-related increase in daytime sleepiness in the follow-up survey, in spite of small sample size and sparsely distributed data. There was not a significant increase in positive responses to the question that had originally prompted the interest in insomnia, nor was there any exposure-related decrease in the number of reported hours slept. However, the time intervals used were relatively crude (one hour). It may be that sleepiness may be an acute effect of exposure to DEET. However, the epidemiologic and anecdotal evidence of the occurrence of insomnia suggests that it may be a biological effect of DEET.

In the initial survey, there was an increased prevalence of affect lability or emotional instability, as measured on the questionnaire regarding symptoms of depression and irritability, as well as an increase in some other neurologic symptoms (i.e., muscle cramping and urinary hesitancy). However, these results were not substantiated in the follow-up survey. Conversely, whereas no association with exposure was seen in the initial survey with complaints of memory problems, difficulty concentrating, or absentmindedness, the follow-up study demonstrated a significant dose-response relationship with the dimension referred to as "impaired cognitive functioning," measured by the Psychic Distress Questionnaire. This dimension is comprised of three items: trouble remembering things, trouble making up one's mind, and being bothered by some unimportant thoughts. The statistical significance of these findings (increased depression and irritability in the initial survey and "impaired cognitive functioning" in the follow-up study) may have been a result of having made multiple comparisons, although the general trend, especially in the initial survey, was consistent with increasing neurotoxic symptomatology with increasing dose.

The occurrence of neurologic effects is compatible with the animal literature and anecdotal human evidence suggesting that DEET may be neurotoxic. Difficulty starting or stopping of urinary stream noted in the first questionnaire is of biologic significance in view of unpublished accounts of distended bladder and uremia in rodents dosed

with DEET (Bryan Hardin, National Institute for Occupational Safety and Health, unpublished data). However, the follow-up study failed to show any exposure-related increase in symptoms over the course of the study.

It should be noted that, in general, some caution is appropriate in interpreting the statistical significance of the results of this study, since multiple comparisons were made which may have resulted in spurious associations. In addition, sample size was smaller during the prospective follow-up study, and the incidence of symptoms developed was sparsely distributed; i.e., there were few people in any exposure categories who developed symptoms. It may be, therefore, that the study may have been insensitive to subtle health effects of exposure.

The finding in the initial cross-sectional survey of a higher prevalence of skin rash or blisters among more highly exposed workers is consistent with other reports of dermatologic reactions.²⁶⁻²⁹ Although the occurrence of rashes resulting in ulceration and scarring in the antecubital fossae has been documented in the literature^{26,27}, only one worker in this survey reported a rash occurring in the distribution seen in these reports, and the reaction was not severe.

The anecdotal reports of dizziness, disorientation, headache, and other neurologic symptoms reported in the initial survey are difficult to interpret in the absence of increased prevalence of these symptoms among more exposed workers. Several explanations are possible. It may be that workers who develop such dramatic symptoms do not continue to use the repellants and so would not have had symptoms at the time of the follow-up study. Alternatively, it may be that their symptoms are not actually caused by exposure to insect repellant or that they are especially sensitive to effects of DEET. It has been suggested that genetic deficiency of ornithine carbamoyl transferase may have been a predisposing factor to childhood DEET-associated encephalopathy²³

VIII. CONCLUSIONS

Our results indicate an association between DEET exposure and daytime sleepiness, possibly reflecting nighttime insomnia. In addition, there was a significant increase in symptoms from the Psychic Distress Questionnaire compatible with "impaired cognitive function." Increased affect lability, urinary hesitancy, and muscle cramping are less convincingly associated with DEET exposure. Rashes associated with DEET in the initial questionnaire survey are consistent with previous reports of DEET-related rashes.

The safety of DEET-containing products for use by the public and occupationally exposed groups should be reconsidered in terms of this and other available scientific literature. Based on the anecdotal cases of encephalopathy associated with heavy DEET exposure among children, the possibility that children are more susceptible to neurologic effects of DEET should be investigated for its impact on consumer product safety.

Unfortunately, there are few effective alternatives to DEET for workers in mosquito-infested areas such as Everglades National Park. The available alternatives may also pose potential hazards. Dimethyl phthalate, for example, which is formulated with DEET in Cutter's lotion (one of the preparations used in the Park) has been shown to cause birth defects in rats.^{36,37} It is therefore not appropriate to encourage substitution of this compound for DEET-containing repellants. Some workers use over-the-counter preparations such as Avon Skin So Soft®, mosquito netting, or repellent impregnated jackets. Such measures, which will help decrease exposure to DEET, may be the only available alternatives in this situation.

IX. RECOMMENDATIONS

1. In the absence of a safe alternative with the efficacy of DEET, we recommend that exposure to this insect repellant be minimized. Specifically, we recommend that the practice of pouring 75% DEET (government issue lotion) into a squirt bottle for application be discontinued, as this practice results in extremely high exposures. Where possible, repellant-impregnated jackets would seem preferable to direct dermal application to arms. When repellant is applied directly to skin it should be used sparingly.
2. The rashes which occurred more commonly in the initial cross-sectional study among heavier users of DEET are consistent with previous reports. We recommend that formulations containing lower concentrations of DEET be used instead of the 75% DEET government issue repellent. Severe skin reactions with ulceration and scarring have been reported in studies of military personnel using 75% DEET formulations. Although such reactions have not been reported (to our knowledge) among Everglades National Park employees, the possibility may be further minimized by applying no more repellant than absolutely necessary to the sensitive areas (the eyelids and the crease areas of the elbows and the backs of the knees).

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XII. 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), 5285 Port Royal, Springfield, Virginia 22161. Information regarding its availability through NTIS can be obtained from NIOSH Publications Office at the Cincinnati address. Copies of this report have been sent to:

1. Everglades National Park, Everglades, Florida
2. National Park Service, Department of the Interior
3. NIOSH, Region IV
4. OSHA, Region IV

For the purpose of informing affected employees, copies of this report shall be posted by the employer in a prominent place accessible to the employees for a period of 30 calendar days.

Table 1

DEET CONTENT IN INSECT REPELLANTS
EVERGLADES NATIONAL PARK, FLORIDA
HETA 83-085

INSECT REPELLENT	PERCENT DEET*
Off Spray [®] (primarily 6 oz. cans)	15
Gutter Spray [®] (primarily 6 oz. cans)	18
Muskol Lotion (1 oz.)	100
Muskol spray (6 oz. cans)	25
Government Issue spray (2 oz. cans)	75
Deep Woods Off Lotion [®] (1 oz. bottle)	30
Gutter Lotion [®] (1 oz. bottle)	35
Government Issue Lotion (2 oz. bottle)	75

*Includes small amounts of ortho- and para- isomers of DEET present in all formulations.

Table 2

PARTICIPANTS BY LEVEL OF DEET EXPOSURE

EVERGLADES NATIONAL PARK, FLORIDA

HETA 83-085

INITIAL SURVEY: AUGUST 1984

EXPOSURE GROUP	NUMBER OF PARTICIPANTS (Percent of Total)	ESTIMATED DEET SKIN EXPOSURE (grams/week)*
LOW	44 (31)	Non-users
MEDIUM	55 (38)	Regular users exposed to <4.25 gm/week
HIGH	44 (31)	>4.25 gm/week
TOTAL	143 (100)	

*Grams of DEET = Reported Volume of Repellent Used (gms) x Percent DEET in Repellant (x 1/3 for aerosol applications)

Table 3

ESTIMATED DERMAL DEET EXPOSURE AMONG REGULAR USERS OF
INSECT REPELLENT

EVERGLADES NATIONAL PARK, FLORIDA

HETA 83-085

INITIAL SURVEY: AUGUST 1984

QUANTILE (N=99 regular users)	DERMAL DEET EXPOSURE (grams/week)*
25%	< 2.1
median	= 2.6
75%	< 7.1
90%	< 31.1
95%	< 66.3
99%	< 392.6
mean	= 14.6

*Grams of DEET = Reported Volume of Repellant Used (gms) x Percent DEET in
Repellent (x 1/3 for aerosol applications)

Table 4

DEMOGRAPHIC CHARACTERISTICS AND POTENTIAL CONFOUNDERS
BY DEET EXPOSURE

EVERGLADES NATIONAL PARK, FLORIDA

HETA 83-085

INITIAL SURVEY: AUGUST 1984

DEMOGRAPHIC CHARACTERISTIC	EXPOSURE		
	Low (N=44)	Medium (N=55)	High (N=44)
Age (mean \pm std deviation)	29.4 \pm 10.2	35.5 \pm 12.8	36.0 \pm 13.0
Education (mean years \pm std dev)	13.7 \pm 2.8	14.8 \pm 2.1	13.8 \pm 2.6
	(% of Respondents in Each Exposure Group)		
	Low (N= 44)	Medium (N=55)	High (N=44)
Sex			
Male	70	60	75
Female	30	40	25
Race			
White (not hispanic)	80	91	86
Non-white or hispanic	20	9	14
Diabetes (ever)	2	2	7
Hobbies involving chemical exposure	14	13	14
Other chemical exposure on this job	23	31	34
** Pesticide use on job	18	13	34
** Previous job with chemical exposure	30	12	40
Use of medications (previous week)	32	47	45
Symptoms unrelated to DEET (last 2 weeks) ⁺	36	33	48
Smokers (current)	66	51	59
* Consumes 1 or more drinks in average week	66	65	84

* $p < .10$ by 2-tailed chi square test (or Fisher's exact test)

** $p < .05$ by 2-tailed chi square test (or Fisher's exact test)

*** $p < .01$ by 2-tailed chi square test (or Fisher's exact test)

⁺ Chills or shakes, loss of appetite, diarrhea, nausea or vomiting (all thought unlikely to be caused by exposure to DEET). Reporting of these symptoms is used to control for possible overreporting by high exposure group.

Table 5

NEUROBEHAVIORAL SYMPTOMS ("SWEDISH 16" QUESTIONNAIRE)
BY DEET EXPOSURE

EVERGLADES NATIONAL PARK, FLORIDA
HETA 83-085
INITIAL SURVEY: AUGUST 1984

SYMPTOMS	EXPOSURE		
	(% of Respondents in Each Exposure Group)		
	Low (N=44)	Medium (N=55)	High (N=44)
<u>"In general, are you troubled by any of the following symptoms"</u> ⁺			
Difficulty buttoning or unbuttoning	0	0	7
Paresthesias (tingling)	2	3	7
Tiredness	14	13	14
Lack of sexual interest	5	4	16
Absentmindedness	23	18	36
* Affective Symptoms	20	25	41
Feel Depressed	16	22	34
Feel Irritable	16	18	32
Neuro-vegetative symptoms	41	53	52
Memory	48	11	64

⁺ Preface to questions from previous validated neurobehavioral questionnaire¹

* $p < .10$ by 2-tailed chi square test (or Fisher's exact test)

** $p < .05$ by 2-tailed chi square test (or Fisher's exact test)

*** $p < .01$ by 2-tailed chi square test (or Fisher's exact test)

Table 6

OTHER NEUROBEHAVIORAL SYMPTOMS, BY DEET EXPOSURE

EVERGLADES NATIONAL PARK, FLORIDA

HETA 83-085

INITIAL SURVEY: AUGUST 1984

SYMPTOMS	EXPOSURE		
	(% of Respondents in Each Exposure Group)		
	Low (N=44)	Medium (N=55)	High (N=44)
"During <u>just</u> the past 2 weeks..."			
** Other Neurologic symptoms	48	69	73
Weaving & staggering	5	4	0
when walking			
Episodes of confusion	0	2	2
or disorientation			
Frequent stumbling	2	4	5
Weakness or clumsiness	2	7	9
Fainting or dizziness	9	5	11
Giddiness or lightheadedness	7	11	14
of legs			
Slurred speech or	5	4	14
difficulty pronouncing			
* Urinary Hesitancy (difficulty	2	4	18
-starting of start in the			
urinary stream)			
Weakness	16	13	23
** Muscle cramps	7	24	25
*** Insomnia	11	35	45
Headache	43	58	61

* p<.10 by 2-tailed chi square test (or Fisher's exact test)

** p<.05 by 2-tailed chi square test (or Fisher's exact test)

*** p<.01 by 2-tailed chi square test (or Fisher's exact test)

Table 7

OTHER MEDICAL SYMPTOMS OR CONDITIONS, BY DEET EXPOSURE

EVERGLADES NATIONAL PARK, FLORIDA

HETA 83-085

INITIAL SURVEY: AUGUST 1984

SYMPTOMS	EXPOSURE		
	(% of Respondents in Each Exposure Group)		
	Low (N=44)	Medium (N=55)	High (N=44)
"During <u>just</u> the past 2 weeks..."			
Mucous membrane irritation	50	58	66
** Skin rash or blisters	7	14	27
** Chest pain or wheezing	11	9	30
Slurred speech or difficulty pronouncing	5	4	14
Prickling sensation around nose	2	9	11
Numbness of lips or tongue	0	7	11
* Difficulty starting or stopping urinary stream	2	4	18
*** <u>Ever</u> noticed any symptom attri- buted by worker to repellent	14	14	50

* $p < .10$ by 2-sided chi square Test (by Fisher's exact test, if more than 20% of cells had less than 5 entries).

** $p < .05$ by 2-sided chi square Test (by Fisher's exact test, if more than 20% of cells had less than 5 entries).

*** $p < .01$ by 2-sided chi square Test (by Fisher's exact test, if more than 20% of cells had less than 5 entries).

Table 8

ESTIMATED DERMAL DEET EXPOSURE
EVERGLADES NATIONAL PARK, FLORIDA
HETA 83-085
FOLLOW-UP STUDY: MARCH TO AUGUST, 1985

24-HOUR EXPOSURE INDEX

Quantile (N=77)	24-Hour Exposure Index (grams/24-hours)
25%	0.0
median	0.2
75%	< 0.7
90%	< 5.2
95%	< 11.5
99%	< 55.3
mean	2.4

Table 9

NEUROBEHAVIORAL SYMPTOMS DEVELOPED ("SWEDISH 16" QUESTIONNAIRE,
BY DEET EXPOSURE

EVERGLADES NATIONAL PARK, FLORIDA
HETA 83-085
FOLLOW-UP STUDY: MARCH TO AUGUST, 1985

SYMPTOM DEVELOPED (MARCH TO AUGUST)	NUMBER (%)* DEVELOPING SYMPTOM BY EXPOSURE GROUP		
	UNEXPOSED	MEDIUM	HIGH
"In general, are you troubled by any of the following symptoms"+			
Absentmindedness	1 (5)	3 (14)	2 (14)
Affective Symptoms	2 (11)	3 (13)	0
Tiredness	0	0	1 (5)
Lack of sexual interest	0	0	1 (5)
Neuro-vegetative symptoms	0	1 (6)	1 (8)
Paresthesias	1 (4)	0	1 (4)
Difficulty buttoning or unbuttoning	1 (4)	0	1 (5)
Forgetfulness	2 (14)	1 (10)	0

* The number of subjects varies because subjects who had reported symptoms in March were not included in the analysis.

Table 10

OTHER NEUROBEHAVIORAL SYMPTOMS DEVELOPED, BY DEET EXPOSURE

EVERGLADES NATIONAL PARK, FLORIDA

HETA 83-085

FOLLOW-UP STUDY: MARCH TO AUGUST, 1985

SYMPTOM DEVELOPED (MARCH TO AUGUST)	NUMBER (%)* DEVELOPING SYMPTOM BY EXPOSURE GROUP		
	UNEXPOSED	MEDIUM	HIGH
Weaving & staggering when walking	0	2 (7)	2 (9)
Episodes of confusion or disorientation	1 (4)	2 (7)	0
Weakness or clumsiness of legs	0	1 (4)	1 (6)
Fainting or dizziness	1 (4)	0	1 (5)
Giddiness or lightheadedness	1 (4)	2 (8)	5 (25)
Slurred speech or difficulty pronouncing	2 (9)	3 (13)	4 (19)
Urinary Hesitancy (diffi- culty starting or start in the urinary stream)	0	2 (7)	1 (5)
Weakness	3 (12)	4 (16)	2 (10)
Muscle cramps	1 (5)	2 (9)	0
Insomnia -	3 (19)	3 (15)	4 (27)
Headache	5 (38)	3 (19)	6 (60)
Loss of balance	1 (4)	1 (4)	2 (9)
Muscle aches and Pain	1 (5)	4 (17)	0
Frequent urination	3 (18)	2 (13)	0

* The number of subjects varies because subjects who had reported symptoms in March were not included in the analysis.

Table 11

OTHER SYMPTOMS DEVELOPED BY DEET EXPOSURE

EVERGLADES NATIONAL PARK, FLORIDA

HETA 83-085

FOLLOW-UP STUDY: MARCH TO AUGUST, 1985

SYMPTOM DEVELOPED (MARCH TO AUGUST)	NUMBER (%)* DEVELOPING SYMPTOM BY EXPOSURE GROUP		
	UNEXPOSED	MEDIUM	HIGH
Numbness of lips or tongue	1 (4)	2 (7)	2 (9)
Prickling sensation around nose	2 (8)	1 (4)	5 (24)
Rash (skin rash or blisters)	2 (8)	1 (8)	4 (22)
Chest pain or wheezing	1 (4)	2 (9)	3 (16)
Mucous membrane irritation	3 (21)	7 (58)	5 (62)
Abnormal sensation of sweating	0	2 (7)	1 (5)
<u>Ever</u> noticed any symptom attributed by worker to repellent			
Pain on urination	0	1 (4)	1 (4)

* The number of subjects varies because subjects who had reported symptoms in March were not included in the analysis.

Table 12

PERIPHERAL NEUROPATHIC SYMPTOMS DEVELOPED, BY DEET EXPOSURE

EVERGLADES NATIONAL PARK, FLORIDA

HETA 83-085

FOLLOW-UP STUDY: MARCH TO AUGUST, 1985

SYMPTOM DEVELOPED (MARCH TO AUGUST)	NUMBER (%) * DEVELOPING SYMPTOM BY EXPOSURE GROUP		
	UNEXPOSED	MEDIUM	HIGH
Muscle cramps	1 (4)	9 (32)	4 (18)
Need help getting out of chair	0	0	0
Burning in arms or legs	0	0	1 (5)
Pain in arms	1 (4)	2 (7)	5 (22)
Paresthesias	2 (8)	2 (7)	3 (13)
Difficulty opening screw top lids	2 (9)	3 (11)	5 (22)
Muscle twitching	2 (8)	2 (7)	4 (18)
Numbness	5 (20)	3 (11)	5 (22)

* The number of subjects varies because subjects who had reported symptoms in March were not included in the analysis.

Table 13

SLEEP-RELATED SYMPTOMS DEVELOPED (STANFORD SLEEP QUESTIONNAIRE)
BY DEET EXPOSURE

EVERGLADES NATIONAL PARK, FLORIDA
HETA 83-085
FOLLOW-UP STUDY: MARCH TO AUGUST, 1985

SYMPTOM DEVELOPED SYMPTOM (MARCH TO AUGUST)	NUMBER (%) [†] DEVELOPING BY EXPOSURE GROUP		
	UNEXPOSED	MEDIUM	HIGH
* Daytime sleepiness (9)	1 (5)	7 (26)	9 (39)
Daytime fatigue (10)	5 (21)	3 (11)	3 (13)
Sleepiness during (47-54):			
Intercourse	1 (5)	1 (5)	1 (8)
Meals	0	1 (4)	0
Telephone conversation (49)	0	0	0
Work conversation	1 (5)	2 (10)	1 (8)
* Attending a performance (e.g. Film)	6 (33)	5 (26)	6 (60)
Watching television	3 (50)	0	4 (67)
Listening to radio	2 (20)	0	4 (44)
(Near) misses or auto accidents (55)	2 (9)	4 (17)	0
Cataplexy (58)	1 (4)	0	0
Excessive daytime sleepiness (59)	0	1 (4)	3 (17)
Medication to stay awake (65)	0	0	2 (18)

† The number of subjects varies because subjects who had reported symptoms in March were not included in the analysis.

* $p < .05$ by chi square test

Table 14

NEUROBEHAVIORAL SYMPTOMS DEVELOPED* (PSYCHIC DISTRESS QUESTIONNAIRE)
BY DEET EXPOSURE

EVERGLADES NATIONAL PARK, FLORIDA
HETA 83-085
FOLLOW-UP STUDY: MARCH TO AUGUST, 1985

SYMPTOM COMPLEX	UNEXPOSED	DEET EXPOSURE	
		MEDIUM	HIGH
Mood Depression	0/22 (0%)	2/24 (8%)	2/17 (12%)
Anergia	3/22 (13)	5/24 (21)	7/18 (39)
Mood Anxiety	1/18 (6)	2/23 (9)	1/17 (6)
** Impaired Cognitive Functioning	2/21 (9)	5/20 (25)	7/13 (54)

* The number of subjects varies because subjects who had reported symptoms in March were not included in the analysis.

** $p = .006$ (exposure variable=24-hour exposure index by chi-square test).

Table 15

MEAN CHANGE IN NEUROPERFORMANCE SCORE *
(AUGUST SCORE MINUS MARCH SCORE)
BY DEET EXPOSURE

EVERGLADES NATIONAL PARK, FLORIDA
HETA 83-085

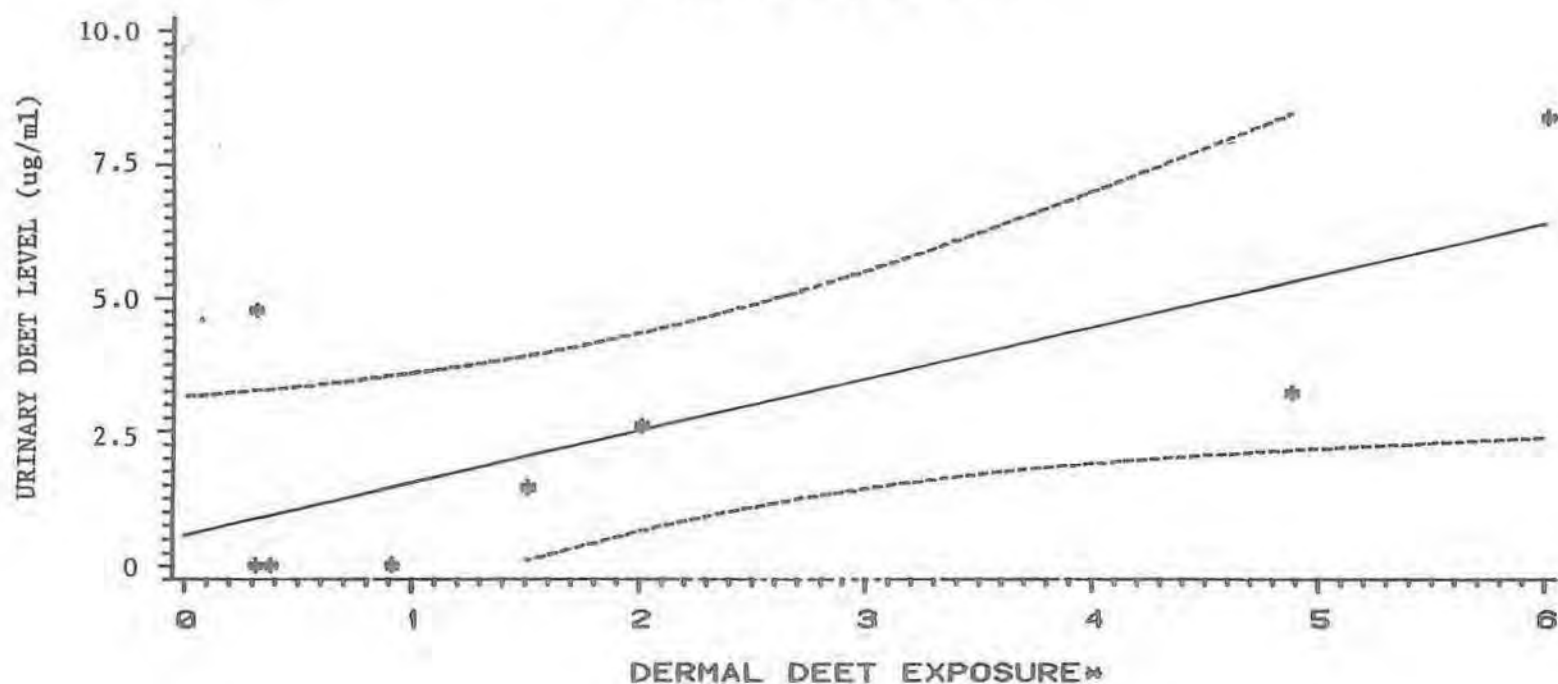
FOLLOW-UP STUDY: MARCH TO AUGUST, 1985

<u>Test</u>	<u>UNEXPOSED (N=25)</u>	<u>MEDIUM (N=32)</u>	<u>HIGH (N=20)</u>
GAIT (# of steps)	-12.0	-9.7	-14.5
BALANCE TIME (sec.)	-6.3	-4.8	-3.5
MEMORY SCANNING TEST:			
Slope (Memory Scanning Time) (msec/digit)	-22.0	-13.0	33.0
Intercept (Psychomotor Reaction Time) (msec.)	-7.0	-39.0	49.0
Errors	-0.1	0.4	0.9
SANTA ANA DEXTERITY TEST (# pegs turned/30 secs.)	-0.9	-2.2	-1.5

- * Higher scores reflect better performance on gait, balance, and Santa Ana tests.
Higher scores reflect poorer performance on parameters of memory scanning test.

FIGURE 1

RELATIONSHIP OF URINARY DEET
TO DERMAL DEET EXPOSURE
EVERGLADES NATIONAL PARK, FLORIDA
AUGUST, 1984



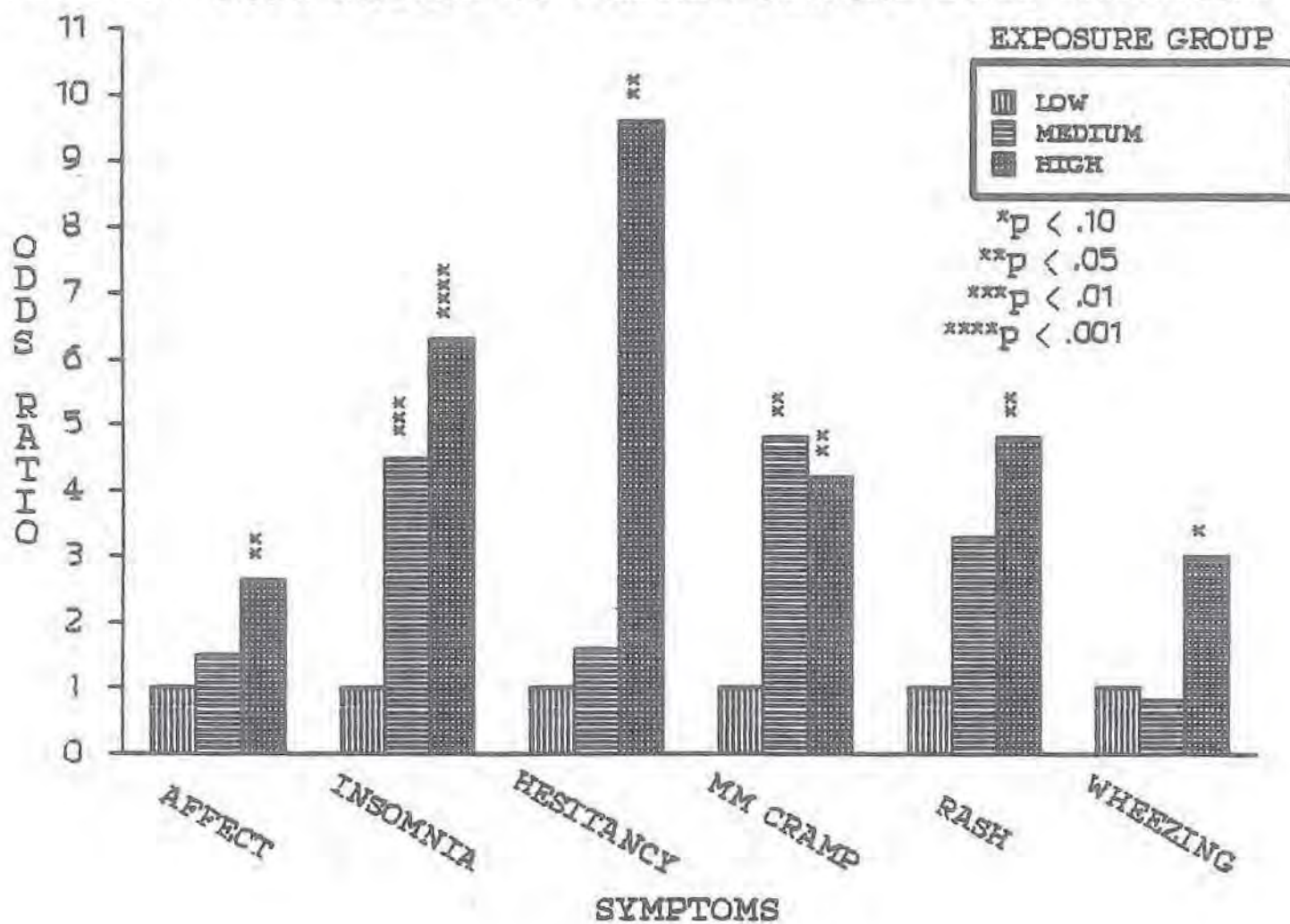
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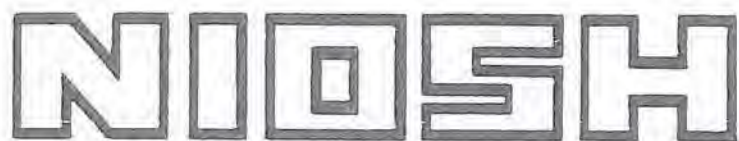
P=.04

* NUMBER OF APPLICATIONS DURING DAY OF URINE COLLECTION X PERCENTAGE DEET IN PRODUCT
(X 1/3 FOR AEROSOL APPLICATIONS)

FIGURE 2
INITIAL SURVEY: AUGUST 1984

SYMPTOM ODDS RATIOS BY WEEKLY DERMAL DEET EXPOSURE



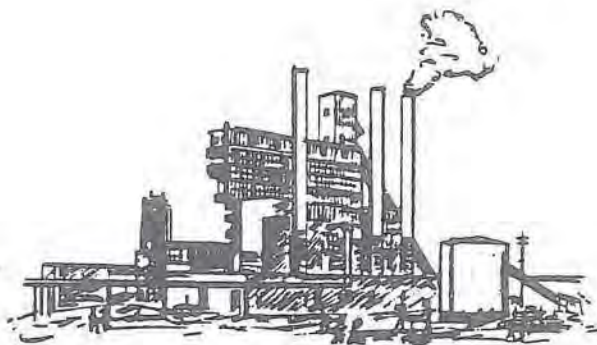


EVERGLADES NATIONAL PARK FORESTRY SERVICE
EVERGLADES, FLORIDA

HEALTH HAZARD EVALUATION # 83-085

QUESTIONNAIRE

JULY 1984



U. S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service/Centers for Disease Control
National Institute for Occupational Safety and Health

I work for the National Institute for Occupational Safety and Health (NIOSH), a research agency which is part of the Centers for Disease Control. NIOSH has the responsibility for investigating questions from workers or management about work-related hazards. NIOSH has been asked by the Park Service (with the support of AFGE Local 3162) to help determine if there are any health problems related to work here at Everglades National Park.

The questionnaire you are about to fill out will be asking a variety of questions about your work here in the Everglades and about your health. A summary of group results will be made public. However, all of your answers will remain confidential and will not be provided in personally identifiable form to either representatives of management or labor without your permission. Your participation is voluntary. However, I hope you will agree to fill out this questionnaire, because I will only be able to give you answers about any health problems which may exist (and how to protect yourself) if everyone does participate. If you have additional questions, I will be available to see you personally while I am here, or you may contact me by mail or by phone. I can be reached at:

4676 Columbia Parkway, R-10
Cincinnati, OH 45226
(513) 684-4386

Rob McConnell

Rob McConnell, M.D.

(1-4)

Please fill in the following with one letter or number in each box.

Name: _____ (11-25)
Last name

_____ (26-40) _____ (41)
First name Middle initial

Address: _____ (42-61)
Street

1. City (62-76)

CARD | 0 | 1 | (79-80)

State (5-6) Zip code (7-11)

Telephone number: Home - - (12-21)
Area code

Work: - - (22-31)
Area code

PERSONAL DATA:

2. Race (check one):

White, not of Hispanic origin.....	1
Black, not of Hispanic origin.....	2
Hispanic.....	3
American Indian or Alaskan Native.....	4
Asian or Pacific Islander.....	5
Other (Specify)	6

(32)

3. Sex (check one): Male.....1
Female.....2 (33)

4. Date of birth: - - (34-39)
Month Day Year

5. Circle the highest year that you reached in school:

Grade School: 01 02 03 04 05 06 07 08 09 10 11 12 (40-41)
 College: 13 14 15 16 17 18
 Freshman Sophomore Junior Senior Masters Doctorate

Now I am going to ask you some questions about your health.

6. What is your current weight?
 (Please fill in the number of pounds). pounds (42-44)

7. What is your current height? feet inches (45-47)

During just the past two weeks, how many days would you say you have noticed each of the following problems? (CIRCLE THE NUMBER OF DAYS. CIRCLE 00 IF YOU HAVE NOT NOTICED A PROBLEM)

	NUMBER OF DAYS																
8. Headache	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(48-49)	
9. Watery/burning/ "pink"/itchy eyes	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(50-51)	
10. Runny/stuffy nose	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(52-53)	
11. Coughing spells	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(54-55)	
12. Skin rash or blisters not related to trauma	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(56-57)	
13. Chills or shakes	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(58-59)	
14. Wheezing	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(60-61)	
15. Chest pain	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(62-63)	
16. Nausea or vomiting	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(64-65)	
17. Fainting/dizziness	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(66-67)	
18. Episodes of confusion or disorientation	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(68-69)	

CARD 0 2 (79-80)

19. Loss of sensation of sweating	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(5-6)
20. Weakness	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(7-8)
21. Loss of appetite	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(9-10)
22. Muscle cramping	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(11-12)
23. Giddiness or light-headedness	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(13-14)
24. Trouble falling asleep or staying asleep	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(15-16)
25. Slurred speech or difficulty pronouncing words	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(17-18)
26. Prickling sensation around your nose	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(19-20)
27. Numbness of lips or tongue	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(21-22)
28. Diarrhea	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(23-24)
29. Frequent stumbling	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(25-26)
30. Difficulty starting or stopping the stream when urinating	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(27-28)
31. Frequent loss of balance	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(29-30)
32. Weakness or clumsiness of legs	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(31-32)
33. Weaving & staggering when you walk	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(33-34)

In general (not just during the past two weeks) would you say you are troubled by any of the following? (CHECK YES OR NO.)

- | | |
|--|--|
| 34. Do you tire more easily than other people your age, for the amount of activity you do? | Yes <u> </u> 1
No <u> </u> 2 (35) |
| 35. Do you often have to go back and check things you have done such as turn off the stove, lock the door, etc.? | Yes <u> </u> 1
No <u> </u> 2 (36) |
| 36. Are you less interested in sex than most other people of your age and sex? | Yes <u> </u> 1
No <u> </u> 2 (37) |
| 37. Do you have difficulty concentrating? | Yes <u> </u> 1
No <u> </u> 2 (38) |
| 38. Are you frequently confused or disoriented? | Yes <u> </u> 1
No <u> </u> 2 (39) |
| 39. Do you have trouble remembering things? | Yes <u> </u> 1
No <u> </u> 2 (40) |
| 40. Do your relatives notice that you have trouble remembering things? | Yes <u> </u> 1
No <u> </u> 2 (41) |
| 41. Do you frequently feel irritable for no particular reason? | Yes <u> </u> 1
No <u> </u> 2 (42) |
| 42. Do you feel depressed for no particular reason? | Yes <u> </u> 1
No <u> </u> 2 (43) |
| 43. Do you have palpitations of the heart even when you don't exert yourself? | Yes <u> </u> 1
No <u> </u> 2 (44) |
| 44. Do you often have to make notes to remember things? | Yes <u> </u> 1
No <u> </u> 2 (45) |
| 45. Do you generally find it hard to get the meaning from reading newspapers and books? | Yes <u> </u> 1
No <u> </u> 2 (46) |
| 46. Do you sometimes feel pressure in your chest? | Yes <u> </u> 1
No <u> </u> 2 (47) |

47. Do you perspire without any particular reason? Yes 1
No 2 (46)
48. Do you have a headache at least once a week? Yes 1
No 2 (49)
49. Do you often have painful tingling in your hands or feet? Yes 1
No 2 (50)
50. Do you have any problems with buttoning or unbuttoning your shirt? Yes 1
No 2 (51)
51. Do you ever feel "drunk" when you have not been drinking? Yes 1
No 2 (52)

In just the last 6 months have you had any of the following medical problems?
(CHECK YES OR NO)

52. Liver Disease Yes 1
No 2 (53)
53. Kidney Disease Yes 1
No 2 (54)
54. Bladder or urinary tract infection Yes 1
No 2 (55)
55. In the past week have you used any medications (prescribed by a physician or over the counter)? Yes 1
No 2 (56)
56. In the past two months have you had any problems with your skin other than sunburn or insect bites? Yes 1
No 2 (57)

IF NO, go on to question #64.

IF YES, please check the most appropriate box. Check only one box

57. Itchy rash on arms or legs 1
58. Non-itchy redness on arms or legs 2
59. Painful blisters unrelated to rubbing or sunburn 3 (58)
60. Rash or blisters in the crook of your arm (front of elbow) 4
61. Rash or blisters on the back of your knee 5
62. Other 6

63. IF YES, have any of these problems lasted more than 48 hours? Yes 1
No 2 (59)

CARD 0 3 (79-80)

64. Did you have skin problems last summer?

Yes 1
No 2 (5)

IF NO, go on to question #67.

IF YES:

65. Are you having the same type of skin problem now?

Yes 1
No 2 (6)

66. If you had a skin problem last summer, did it improve during the winter?

Yes 1
No 2 (7)

67. Have you ever been told by a doctor that you have diabetes?

Yes 1
No 2 (8)

68. Have you ever been seen by a doctor for heat exhaustion or heat stroke?

Yes 1
No 2 (9)

IF NO, go on to question #70.

69. IF YES, please give date (year).

 (10-11)

Now I am going to ask you some questions about your reproductive health.

MALE RESPONDENTS ONLY:

During the past ten years have you had any of the following problems?

IF YES, give year. Did you consult a doctor?

	YES/NO	YEAR	CONSULTED A DOCTOR
70. Impotence (inability to have or maintain an erection)	Yes <u> </u> 1 No <u> </u> 2 (12)	<u> </u> <u> </u> (13-14)	Yes <u> </u> 1 No <u> </u> 2 (15)
71. Orgasm without producing semen	Yes <u> </u> 1 No <u> </u> 2 (16)	<u> </u> <u> </u> (17-18)	Yes <u> </u> 1 No <u> </u> 2 (19)
72. Loss of interest in sex	Yes <u> </u> 1 No <u> </u> 2 (20)	<u> </u> <u> </u> (21-22)	Yes <u> </u> 1 No <u> </u> 2 (23)
73. Have you tried for a full year with your wife or partner to have a child, but failed to do so?	Yes <u> </u> 1 No <u> </u> 2 (24)	<u> </u> <u> </u> (25-26)	Yes <u> </u> 1 No <u> </u> 2 (27)

ALL RESPONDENTS:

Have you or your spouse or partner ever had a:

	<u>YES/NO</u>	<u>YEAR</u>	
74. Miscarriage	Yes <u> </u> 1 No <u> </u> 2 (28)	<u> </u> <u> </u> <u> </u>	(29-30)
75. Still-birth (born dead after 28 weeks of pregnancy)	Yes <u> </u> 1 No <u> </u> 2 (31)	<u> </u> <u> </u> <u> </u>	(32-33)
76. Baby born with a birth defect	Yes <u> </u> 1 No <u> </u> 2 (34)	<u> </u> <u> </u> <u> </u>	(35-36)

HABITS

77. Have you ever smoked cigarettes? Yes 1
No 2 (37)

IF NO, go on to question #81.

IF YES:

78. Do you smoke cigarettes now? Yes 1
No 2 (38)

79. Total number of years smoked: | | | (39-40)

80. Average number of cigarettes smoked per day: | | | (41-42)

81. Have you smoked marijuana or used other recreational drugs in the last two weeks? Yes 1
No 2 (43)

82. If a drink is 1 can or bottle of beer, 1 glass of wine or 1 cocktail or shot of liquor, then how many drinks do you have in a week, on the average? (Fill in appropriate number of drinks) | | | (44-45)

Now I am going to ask you some questions about your work at Everglades National Park.

83. Which job description best fits your work? (CHECK ONE)

Maintenance	<u> </u>	01	
Ranger.....	<u> </u>	02	
Technician	<u> </u>	03	
Interpreter	<u> </u>	04	
Researcher	<u> </u>	05	
Biologist	<u> </u>	06	(46)
Administrative	<u> </u>	07	
Clerical	<u> </u>	08	
Laborer	<u> </u>	09	
Other	<u> </u>	10	

If other, please describe _____

84. Which best describes your work status? (CHECK ONE)

Permanent park employee..... 1
Seasonal park employee..... 2 (47)

IF PERMANENT, go on to question #86.

85. IF SEASONAL, how many weeks total will you work this season? (Fill in the number of weeks in the boxes) (48-49)

86. How many years have you worked in Everglades National Park? (Fill in the number of years in the boxes) (50-51)

87. How long have you worked at your present job? # months (52-54)

88. Approximately what percentage of your work time do you spend outside in an area where you might be bitten by mosquitoes. (Circle a percentage between 000 and 100%).

000 010 020 030 040 050 060 070 080 090 100 (55-57)

Please describe as carefully as possible your exposure to insect repellent.

89. How many hours each week do you wear a bug jacket? # hours (58-59)

These are the code abbreviations used:

PRODUCT	CODE
Cutter Spray	CS
Deep Woods OFF Lotion	DWOL
Gov't Spray or Lotion	GS/ GL

If "other", indicate name and size: _____

PRODUCT NAMES

CS DWOL GS GL CL

90. Check if you use any of these regularly. 1 1 1 1 1
(60) (61) (62) (63) (64)

91. Check if you use them on clothing. 1 1 1 1 1
(65) (66) (67) (68) (69)

92. Check if you use them on your body. 1 1 1 1 1
(70) (71) (72) (73) (74)

CARD 0 4 (79-80)

Indicate the amount of lotion or spray you have used this season in an average week, for the months listed. Include evening and weekend use. Bottles of lotion are the standard issue 2 ounce size. If you have used a different product or commercial container size, please describe under other. Include weekend and evening use in your estimates.

Please indicate to the nearest 1/4 bottle. Use the following codes in the table below:

Code 0.25 for 1/4 bottle
 Code 0.50 for 1/2 bottle
 Code 0.75 for 3/4 bottle
 Code 1.00 for 1 bottle; 2.00 for 2 bottles, etc.

These are the code abbreviations used:

<u>PRODUCT</u>	<u>CODE</u>
Deep Woods OFF Lotion	DMOL
Cutter Spray	CS
Cutter Lotion	CL
Gov't Spray	GS
Gov't Lotion	GL

<u>MONTH</u>	<u>BOTTLES</u> <u>DMOL/WK</u>	<u>CANS</u> <u>CS/WK</u>	<u>CL/WK</u>	<u>GS/WK</u>	<u>GL/WK</u>	<u>(OTHER) INDICATE</u> <u>PRODUCT & SIZE</u>
93. April	(5-7) /Wk	(8-10) /Wk	(11-13) /Wk	(14-16) /Wk	(17-19) /Wk	(20-22)
94. May	(23-25) /Wk	(26-28) /Wk	(29-31) /Wk	(32-34) /Wk	(35-37) /Wk	(38-40)
95. June	(41-43) /Wk	(44-46) /Wk	(47-49) /Wk	(50-52) /Wk	(53-55) /Wk	(56-58)
96. July	(59-61) /Wk	(62-64) /Wk	(65-67) /Wk	(68-70) /Wk	(71-73) /Wk	(74-76)

CARD | 0 | 5 | (79-80)

Yes 1
No 2 (5)

100. If yes, how many times a day do you apply it, on the average?
(Please put number of times in the boxes. Leave blank, if you do not use a sunscreen).

101. Do you use any skin creams or lotions other than insect repellants or suntan lotion? Yes 1
No 2 (8)

IF YES, give their names or a description _____

102. Do you work with pesticides? Yes 1
No 2 (9)

104. IF YES, which of the following have you applied or worked with for a total of 40 hours or more? Indicate those you have worked with in the last month.

	<u>EVER WORKED 40 HOURS OR MORE</u>		<u>EXPOSED IN THE LAST MONTH</u>		
	<u>YES</u>	<u>NO</u>	<u>YES</u>	<u>NO</u>	
105. Malathion	<u> </u> 1	<u> </u> 2 (10)	<u> </u> 1	<u> </u> 2	(11)
106. Roundup	<u> </u> 1	<u> </u> 2 (12)	<u> </u> 1	<u> </u> 2	(13)
107. Velpar	<u> </u> 1	<u> </u> 2 (14)	<u> </u> 1	<u> </u> 2	(15)
108. Garlon	<u> </u> 1	<u> </u> 2 (16)	<u> </u> 1	<u> </u> 2	(17)
109. Cythion	<u> </u> 1	<u> </u> 2 (18)	<u> </u> 1	<u> </u> 2	(19)

110. _____ 1 2 (20) _____ 1 2 (21)

111. _____ 1 2 (22) _____ 1 2 (23)

112. Do you use pesticides at home? 1 2 (24)

FOR THE FOLLOWING QUESTIONS PLEASE CIRCLE THE APPROPRIATE ANSWER.

113. On the average, how many hours daily do you work shirtless?

00 01 02 03 04 05 06 07 08 09 10 11

(25-26)

114. On the average, how many hours daily do you work in a tanktop shirt?

00 01 02 03 04 05 06 07 08 09 10 11

(27-28)

115. On the average, how many times daily do you apply DWOL?

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15

(29-30)

116. On the average, how many times daily do you apply GS/GL?

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16

(31-32)

117. On the average, how many times daily do you apply CS?

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16

(33-34)

118. How many days in a row do you wear the same work clothes between washings?

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14

(35-36)

119. How many hours after arriving home do you usually shower and change clothes?

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14

(37-38)

120. How often do you wash your hands at work before you eat? (Please check one only)

Always _____ 1
Usually _____ 2
Sometimes _____ 3
Seldom _____ 4
Never _____ 5

(39)

121. How often do you wash your hands at work before you smoke? (Please check one only)

Always _____ 1
Usually _____ 2
Sometimes _____ 3
Seldom _____ 4
Never _____ 5

(40)

122. Are you wearing a short sleeved shirt today?

Yes _____ 1
No _____ 2

(41)

123. Are you wearing shorts or cut-offs today?

Yes _____ 1
No _____ 2

(42)

124. Have you ever held a job for 3 or more months in which you were exposed to paint thinners, lead, solvents or any other chemicals? Yes 1
No 2 (43)

IF NO, go on to next question

IF YES, in what job(s) was this?

JOB NO.	FROM	TO	TYPE OF WORK
01	<hr/>		
02	<hr/>		
03	<hr/>		

125. In your present job, are you exposed to any solvents or chemicals other than insect repellants, pesticides or sunscreens either in your work or as a bystander to some other person's job? Yes 1
No 2 (44)

IF NO, go on to question 126.

IF YES, please describe:

126. Do you have any regular hobbies involving handling of solvents, paint thinners or any other chemicals? Yes 1
No 2 (45)

IF NO, go on to the next question

IF YES, please describe:

127. In particular, did you notice any problems when you first started using insect repellent heavily? Yes 1
No 2 (46)

IF YES, please describe:

CARD | 0 | 6 | (79-80)

PRODUCTCODE

Deep Woods OFF Lotion

DWOL

Cutter Spray

CS

Cutter Lotion

CL

Gov't Spray

GS

Gov't Lotion

GL

<u>MONTH</u>	<u>BOTTLES</u> <u>DWOL/WK</u>	<u>CANS</u> <u>CS/WK</u>	<u>CL/WK</u>	<u>GS/WK</u>	<u>GL/WK</u>	<u>(OTHER) INDICAT</u> <u>PRODUCT & SIZE</u>
97. Aug (NB: CARD 7: 5-7)	/Wk (2-5)	/Wk (8-10)	/Wk (11-13)	/Wk (14-16)	/Wk (17-19)	(20-22)
128 Last 7 days only	/Wk (23-25)	/Wk (26-28)	/Wk (29-31)	/Wk (32-34)	/Wk (35-37)	(38-40)

98. Do you use insect repellant on your days off? (CHECK ONE)

Yes

1

No

2

(41)

CARD | 0 | 7 | (79-80)

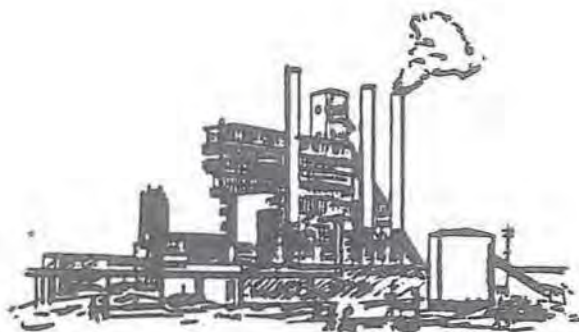
NIOSH

EVERGLADES NATIONAL PARK
FOLLOW-UP STUDY

HETA 83-085

QUESTIONNAIRE

MARCH 1985



EVERGLADES NATIONAL PARK
FOLLOW-UP STUDY
HETA 83-085

QUESTIONNAIRE

THANK YOU FOR AGREEING TO PARTICIPATE IN THIS FOLLOW-UP STUDY TO THE SURVEY WE DID LAST SUMMER.

THIS YEAR WE WOULD LIKE YOU TO FILL OUT A QUESTIONNAIRE AND TAKE SOME SIMPLE TESTS WE WILL ADMINISTER.

IF YOU USE LITTLE OR NO INSECT REPELLANT, YOUR PARTICIPATION IS STILL JUST AS IMPORTANT WE WILL BE COMPARING YOUR ANSWERS AND TEST RESULTS WITH THE RESULTS OF YOUR CO-WORKERS WHO USE A LOT OF REPELLANT. IF YOU DON'T PARTICIPATE, WE WILL HAVE NO ONE TO COMPARE.

WHEN YOU FINISH, GO ON TO THE NEXT STATION. PLEASE DO NOT TELL THE NIOSH INVESTIGATORS ADMINISTERING THE TESTS WHETHER YOU USE A LOT OR A LITTLE INSECT REPELLANT. (IT COULD SUBCONSCIOUSLY INFLUENCE THE WAY THEY SCORE YOUR TESTS). ONLY LATER, WHEN WE ANALYZE THE DATA, WILL WE PUT YOUR QUESTIONNAIRE ANSWERS TOGETHER WITH YOUR RESULTS ON THE TESTS.

(1-4)

I. PERSONAL DATA

II. SYMPTOMS

DURING JUST THE PAST TWO WEEKS, HOW MANY DAYS WOULD YOU SAY YOU HAVE NOTICED EACH OF THE FOLLOWING PROBLEMS? PLEASE INDICATE ALL SYMPTOMS YOU HAVE HAD DURING THE PAST TWO WEEKS, REGARDLESS OF THE CAUSE, UNLESS YOU KNOW THAT IT WAS CAUSED BY CONSUMPTION OF ALCOHOL.

(CIRCLE THE NUMBER OF DAYS. CIRCLE 00 IF YOU HAVE NOT NOTICED A PROBLEM)

	NUMBER OF DAYS															
1. Headache	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(44-45)
2. Watery/burning/ "pink"/itchy eyes	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(46-47)
3. Runny/stuffy nose	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(48-49)
4. Coughing spells	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(50-51)
5. Skin rash or blisters not related to trauma	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(52-53)
6. Chills or shakes	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(54-55)
7. Wheezing	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(56-57)
8. Chest pain	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(58-59)
9. Nausea or vomiting	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(60-61)
10. Fainting/dizziness	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(62-63)
11. Episodes of confusion or disorientation	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(64-65)
12. Loss of sensation of sweating	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(66-67)
13. Weakness	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(68-69)
14. Loss of appetite	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(70-71)
15. Muscle cramping	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(72-73)
16. Giddiness or light-headedness	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(74-75)
17. Trouble falling asleep or staying asleep	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(76-77)

CARD 1021 (79-80)

- | | | | | | | | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------|
| 18. Slurred speech or difficulty pronouncing words | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (5-6) |
| 19. Prickling sensation around your nose | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (7-8) |
| 20. Numbness of lips or tongue | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (9-10) |
| 21. Diarrhea | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (11-12) |
| 22. Frequent stumbling | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (13-14) |
| 23. Difficulty starting or stopping the stream when urinating | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (15-16) |
| 24. Frequent loss of balance | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (17-18) |
| 25. Weakness or clumsiness of legs | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (19-20) |
| 26. Weaving & staggering when you walk | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (21-22) |
| 27. Joint pain or tenderness | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (23-24) |
| 28. Pain on urination | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (25-26) |
| 29. Earache | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (27-28) |
| 30. Blurred vision | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (29-30) |
| 31. Double vision | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (31-32) |
| 32. Muscle cramping or pain | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | (33-34) |

A. Do you have muscle tenderness along with cramping or pain? No 0
(Does it hurt if you squeeze the muscle?) Yes 1 (35)

(1) Hands No 0 Yes 1 (36) (2) Lower Arms No 0 Yes 1 (37)
 (3) Upper Arms No 0 Yes 1 (38) (4) Shoulders No 0 Yes 1 (39)
 (5) Upper Back No 0 Yes 1 (40) (6) Lower Back No 0 Yes 1 (41)
 (7) Upper Legs No 0 Yes 1 (42) (8) Lower Legs No 0 Yes 1 (43)
 (9) Other (specify) No 0 Yes 1 (44)

During the day 1 At night 2 Both day and night 3 (45)

IN GENERAL (NOT JUST DURING THE PAST TWO WEEKS) WOULD YOU SAY YOU ARE TROUBLED BY ANY OF THE FOLLOWING? AGAIN, REMEMBER THAT YOUR ANSWERS ARE CONFIDENTIAL. (CHECK NO OR YES)

- | | |
|--|--|
| 33. Do you tire more easily than other people your age, for the amount of activity you do? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (46) |
| 34. Do you often have to go back and check things you have done such as turn off the stove, lock the door, etc.? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (47) |
| 35. Are you less interested in sex than most other people of your age and sex? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (48) |
| 36. Do you have difficulty concentrating? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (49) |
| 37. Are you frequently confused or disoriented? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (50) |
| 38. Do you have trouble remembering things? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (51) |
| 39. Do your relatives notice that you have trouble remembering things? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (52) |
| 40. Do you frequently feel irritable for no particular reason? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (53) |
| 41. Do you feel depressed for no particular reason? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (54) |
| 42. Do you have palpitations of the heart even when you don't exert yourself? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (55) |
| 43. Do you often have to make notes to remember things? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (56) |
| 44. Do you generally find it hard to get the meaning from reading newspapers and books? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (57) |
| 45. Do you sometimes feel pressure in your chest? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (58) |
| 46. Do you perspire without any particular reason? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (59) |
| 47. Do you have a headache at least once a week? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (60) |
| 48. Do you often have painful tingling in your hands or feet? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (61) |
| 49. Do you have any problems with buttoning or unbuttoning your shirt? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (62) |

50. Do you ever feel "drunk" when you have not been drinking? No 0
Yes 1 (63)
51. Do you have to get up in the middle of the night to urinate? No 0
Yes 1 (64)
52. Have you ever been told by a doctor that you have diabetes? No 0
Yes 1 (65)
53. Have you been told by a doctor that you have had a urinary tract infection at any time in the past five years? No 0
Yes 1 (66)

THE NEXT SET OF QUESTIONS REFERS TO THE PAST FOUR WEEKS.

How often have you had any of the following conditions?
(CHECK ONLY ONE ANSWER FOR EACH QUESTION)

54. Cramps in muscles of arms or legs (Please check one only)
- 5-7 days/week 1
1-4 days/week 2
Less than one day/week 3 (67)
Never 4

55. Twitching of muscles of arms or legs (Please check one only)
- 5-7 days/week 1
1-4 days/week 2
Less than one day/week 3 (68)
Never 4

56. Do you need help getting out of a chair (Please check one only)
- 5-7 days/week 1
1-4 days/week 2
Less than one day/week 3 (69)
Never 4

57. Do you have difficulty opening screw top lids on jars (Please check 1 only)
- 5-7 days/week 1
1-4 days/week 2
Less than one day/week 3 (70)
Never 4

58. Tingling or "pins and needles" sensation in hands, arms, feet, or legs (Please check one only)
- 5-7 days/week 1
1-4 days/week 2
Less than one day/week 3 (71)
Never 4

CARD 03 (79-80)

59. Numbness (parts of your body "go to sleep" for no apparent reason) (Please check one only)

5-7 days/week	_____	1	
1-4 days/week	_____	2	
Less than one day/week	_____	3	(5)
Never	_____	4	

60. A burning sensation in arms or legs (Please check one only)

5-7 days/week	_____	1	
1-4 days/week	_____	2	
Less than one day/week	_____	3	(6)
Never	_____	4	

61. Pain in arms after work when resting (Please check one only)

5-7 days/week	_____	1	
1-4 days/week	_____	2	
Less than one day/week	_____	3	(7)
Never	_____	4	

62. Do you have to strain in order to start the urine flow? (Please check 1 only)

5-7 days/week	_____	1	
1-4 days/week	_____	2	
Less than one day/week	_____	3	(8)
Never	_____	4	

63. Do you have to push on your abdomen in order to start the urine flow or keep the urine flowing?
(Please check one only)

5-7 days/week	_____	1	
1-4 days/week	_____	2	
Less than one day/week	_____	3	(9)
Never	_____	4	

64. Do you have to rush to the rest room to urinate urgently?
(Please check one only)

5-7 days/week	_____	1	
1-4 days/week	_____	2	
Less than one day/week	_____	3	(10)
Never	_____	4	

III. HABITS

65. If a drink is 1 can or bottle of beer, 1 glass of wine or 1 cocktail or shot of liquor, then how many drinks do you have in a week, on the average? (Fill in appropriate number of drinks) (11-12)
66. How many drinks have you had in the past 24 hours? (13-14)
67. How many cups of coffee do you drink daily, on the average? (15-16)
68. How many cups of coffee have you drunk in the past twelve hours? (17-18)
69. How many cups of tea do you drink daily, on the average? (19-20)
70. How many cups of tea have you drunk in the past twelve hours? (21-22)
71. On the average, how many times do you urinate daily? (Fill in average number of times) (23-24)
72. During just the past two weeks have you taken any medications? No 0
(This includes over-the-counter preparations) Yes 1 (25)

IF YES, PLEASE LIST:

MEDICATION	DOSE	HOW OFTEN TAKEN	WHEN LAST TAKEN
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

 (26)

IV. CURRENT JOB INFORMATION

NOW I AM GOING TO ASK YOU SOME QUESTIONS ABOUT YOUR WORK AT EVERGLADES NATIONAL PARK.

73. Which job description best fits your work? (CHECK ONE)

- | | | |
|------------------------------------|----|---------|
| Maintenance..... | 01 | |
| Ranger..... | 02 | |
| Technician..... | 03 | |
| Interpreter..... | 04 | |
| Researcher..... | 05 | |
| Biologist..... | 06 | (27-28) |
| Administrative..... | 07 | |
| Clerical..... | 08 | |
| Laborer..... | 09 | |
| Other (Please describe below)..... | 10 | |

74. Approximately what percentage of your work time do you spend outside in an area where you might be bitten by mosquitoes. (Circle a percentage between 000 and 100%).

000 010 020 030 040 050 060 070 080 090 100 (29-31)

THE NEXT SET OF QUESTIONS ASK ABOUT YOUR USE OF INSECT REPELLANT. INCLUDE EVENING AND WEEKEND USE IN YOUR ESTIMATES.

75. How many hours each week do you currently wear a bug jacket? (FILL IN 000 IF YOU DON'T USE) # hours (32-33)

76. When was the last date that you treated your bug jacket with repellant?

 (34-39)
Month Day Year

77. Do you apply insect repellant to your skin or clothing? No 0
Yes 1 (40)

IF NO, GO TO QUESTION 88 ON PAGE 18. (SKIP QUESTIONS 78-87).

IF YES, PLEASE ANSWER QUESTIONS 78-87 ABOUT YOUR CURRENT USE OF INSECT REPELLANT BASED ON YOUR AVERAGE USE OVER THE PAST TWO WEEKS. INCLUDE EVENING AND WEEKEND USE.

78. Do you use Deep Woods Off lotion?..... No 0
Yes 1 (41)

IF YES:

A. What size container of Deep Woods Off lotion do you use? (CHECK 1 ONLY)

One ounce container 1
Two ounce container 2 (42)

B. Where do you apply Deep Woods Off lotion? (CHECK ONE ONLY)

Exclusively to skin 1
Mostly to skin, but also to clothing (or to bug jacket) 2
About equal amounts to skin and clothing (or to bug jacket) 3 (43)
Mostly to clothing (or to bug jacket) 4
Exclusively to clothing (or to bug jacket) 5

C. How many days does it take you to use up one container of
Deep Woods Off lotion, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (44-45)

D. How many times have you applied Deep Woods Off Lotion in
the last 24 hours?

(FILL IN 00 IF NONE APPLIED IN LAST 24 HOURS) (46-47)

E. How many days does it take you to use up one container of
Deep Woods Off lotion, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (48-49)

79. Do you use Off Spray?..... No 0
Yes 1 (50)

IF YES:

A. What size container of Off Spray do you use? (CHECK ONE ONLY)

Six ounce container 1
Twelve ounce container 2 (51)

B. Where do you apply Off Spray? (CHECK ONE ONLY)

Exclusively to skin 1
Mostly to skin, but also to clothing (or to bug jacket) 2
About equal amounts to skin and clothing (or to bug jacket) 3 (52)
Mostly to clothing (or to bug jacket) 4
Exclusively to clothing (or to bug jacket) 5

C. How many days does it take you to use up one container of Off Spray, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (53-54)

D. How many times have you applied Off Spray in the last 24 hours?

(FILL IN 00 IF NONE APPLIED IN LAST 24 HOURS) (55-56)

E. How many days does it take you to use up one container of Off Spray, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (57-58)

80. Do you use Cutter Lotion?..... No 0
Yes 1 (59)

IF YES:

A. What size container of Cutter Lotion do you use? (CHECK ONE ONLY)

One ounce container 1
Two ounce container 2 (60)

B. Where do you apply Cutter Lotion? (CHECK ONE ONLY)

Exclusively to skin 1
Mostly to skin, but also to clothing (or to bug jacket) 2
About equal amounts to skin and clothing (or to bug jacket) 3 (61)
Mostly to clothing (or to bug jacket) 4
Exclusively to clothing (or to bug jacket) 5

C. How many days does it take you to use up one container of Cutter Lotion, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (62-63)

D. How many times have you applied Cutter Lotion in the last 24 hours?

(FILL IN 0/0 IF NONE APPLIED IN LAST 24 HOURS) (64-65)

E. How many days does it take you to use up one container of Cutter Lotion, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (66-67)

81. Do you use Cutter Spray?..... No 0
 Yes 1 (68)

IF YES:

A. What size container of Cutter Spray do you use? (CHECK ONE ONLY)

Six ounce container 1
 Twelve ounce container 2 (69)

B. Where do you apply Cutter Spray? (CHECK ONE ONLY)

Exclusively to skin 1
 Mostly to skin, but also to clothing (or to bug jacket) 2
 About equal amounts to skin and clothing (or to bug jacket) 3 (70)
 Mostly to clothing (or to bug jacket) 4
 Exclusively to clothing (or to bug jacket) 5

C. How many days does it take you to use up one container of Cutter Spray, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (71-72)

D. How many times have you applied Cutter Spray in the last 24 hours?

(FILL IN 0|0 IF NONE APPLIED IN LAST 24 HOURS) (73-74)

E. How many days does it take you to use up one container of Cutter Spray, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (75-76)

CARD 0|4 (79-80)

82. Do you use Government Issue Lotion?..... No 0
Yes 1 (5)

IF YES:

A. Where do you apply Government Issue Lotion? (CHECK ONE ONLY)

Exclusively to skin 1
Mostly to skin, but also to clothing (or to bug jacket) 2
About equal amounts to skin and clothing (or to bug jacket) 3 (6)
Mostly to clothing (or to bug jacket) 4
Exclusively to clothing (or to bug jacket) 5

B. How many days does it take you to use up one container of Government Issue Lotion, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (7-8)

C. How many times have you applied Government Issue Lotion in the last 24 hours?

(FILL IN 00 IF NONE APPLIED IN LAST 24 HOURS) (9-10)

D. How many days does it take you to use up one container of Government Issue Lotion, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (11-12)

83. Do you use Government Issue Spray?..... No 0
Yes 1 (13)

IF YES:

A. Where do you apply Government Issue Spray? (CHECK ONE ONLY)

Exclusively to skin 1
Mostly to skin, but also to clothing (or to bug jacket) 2
About equal amounts to skin and clothing (or to bug jacket) 3 (14)
Mostly to clothing (or to bug jacket) 4
Exclusively to clothing (or to bug jacket) 5

B. How many days does it take you to use up one container of Government Issue Spray, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (15-16)

C. How many times have you applied Government Issue Spray in the last 24 hours?

(FILL IN 00 IF NONE APPLIED IN LAST 24 HOURS) (17-18)

D. How many days does it take you to use up one container of Government Issue Spray, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (19-20)

84. Do you use Muskol Lotion?..... No 0
 Yes 1 (21)

IF YES:

A. What size container of Muskol Lotion do you use? (CHECK ONE ONLY)

One ounce container 1
 Two ounce container 2 (22)

B. Where do you apply Muskol Lotion? (CHECK ONE ONLY)

Exclusively to skin 1
 Mostly to skin, but also to clothing (or to bug jacket) 2
 About equal amounts to skin and clothing (or to bug jacket) 3 (23)
 Mostly to clothing (or to bug jacket) 4
 Exclusively to clothing (or to bug jacket) 5

C. How many days does it take you to use up one container of Muskol Lotion, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (24-25)

D. How many times have you applied Muskol Lotion in the last 24 hours?

(FILL IN 00 IF NONE APPLIED IN LAST 24 HOURS) (26-27)

E. How many days does it take you to use up one container of Muskol Lotion, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (28-29)

85. Do you use Muskol Spray?..... No 0
Yes 1 (30)

IF YES:

A. What size container of Muskol Spray do you use? (CHECK ONE ONLY)

Six ounce container 1
Twelve ounce container 2 (31)

B. Where do you apply Muskol Spray? (CHECK ONE ONLY)

Exclusively to skin 1
Mostly to skin, but also to clothing (or to bug jacket) 2
About equal amounts to skin and clothing (or to bug jacket) 3 (32)
Mostly to clothing (or to bug jacket) 4
Exclusively to clothing (or to bug jacket) 5

C. How many days does it take you to use up one container of Muskol Spray, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (33-34)

D. How many times have you applied Muskol Spray in the last 24 hours?

(FILL IN 00 IF NONE APPLIED IN LAST 24 HOURS) (35-36)

E. How many days does it take you to use up one container of Muskol Spray, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (37-38)

86. Do you use Avon Skin So Soft Oil?..... No _____ 0
Yes _____ 1 (39)

87. Do you use any other insect repellent?..... No _____ 0
Yes _____ 1 (40)

IF YES:

A. What is the name of this other repellent? _____

B. What size container of this other repellent do you use?

C. Where do you apply this other repellent? (CHECK ONE ONLY)

	Exclusively to skin	_____	1	
Mostly to skin, but also to clothing	(or to bug jacket)	_____	2	
About equal amounts to skin and clothing	(or to bug jacket)	_____	3	(41)
	Mostly to clothing	_____	4	
	Exclusively to clothing	_____	5	

D. How many days does it take you to use up one container of this other repellent, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) | | | (42-43)

E. How many times have you applied this other repellent in the last 24 hours?

(FILL IN [0/0] IF NONE APPLIED IN LAST 24 HOURS) | | (44-45)

F. How many days does it take you to use up one container of this other repellent, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) | | | (46-47)

88. Do you apply pesticides on the job?

No 0
Yes 1 (48)

89. How many hours after arriving home do you usually shower and change clothes?

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 (49-50)

90. How often do you wash your hands at work before you eat? (Please check one)

Always 1
Usually 2
Sometimes 3 (51)
Seldom 4
Never 5

91. How often do you wash your hands at work before you smoke? (Please check one only)

Always 1
Usually 2
Sometimes 3 (52)
Seldom 4
Never 5
Non-smoker 6

92. Are you wearing a short sleeved shirt today?

No 0
Yes 1 (53)

93. Did you wear a short sleeved shirt yesterday?

No 0
Yes 1 (54)

94. Are you wearing a bug jacket today?

No 0
Yes 1 (55)

95. Did you wear a bug jacket yesterday?

No 0
Yes 1 (56)

96. In your present job, are you exposed to any solvents or chemicals other than insect repellants, pesticides or sunscreens either in your work or as a bystander to some other person's job?

No 0
Yes 1 (57)

IF YES, please describe: _____

V. MISCELLANEOUS

97. Do you have any regular hobbies involving handling of solvents, paint thinners or any other chemicals? No 0
Yes 1 (58)

IF YES, please describe: _____

98. Have you had any symptoms which you specifically attribute to the use of insect repellent? No 0
Yes 1 (59)

IF YES, please describe: _____

VI. URINARY DATA

99. When did you last urinate? (FILL IN THE TIME) : (60-63)

PLEASE LEAVE BLANK -- FOR CODERS ONLY: Urinary Volume (64-66)

Urinary Creatinine (67-69)

Urinary DEET (70-73)

Time of Urine Sample : (74-77)

CARD 05 (79-80)

88. Do you apply pesticides on the job? No 0
Yes 1 (48)

89. How many hours after arriving home do you usually shower and change clothes?
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 (49-50)

90. How often do you wash your hands at work before you eat? (Please check one)
Always 1
Usually 2
Sometimes 3 (51)
Seldom 4
Never 5

91. How often do you wash your hands at work before you smoke? (Please check one only)
Always 1
Usually 2
Sometimes 3 (52)
Seldom 4
Never 5
Non-smoker 6

92. Are you wearing a short sleeved shirt today? No 0
Yes 1 (53)

93. Did you wear a short sleeved shirt yesterday? No 0
Yes 1 (54)

94. Are you wearing a bug jacket today? No 0
Yes 1 (55)

95. Did you wear a bug jacket yesterday? No 0
Yes 1 (56)

96. In your present job, are you exposed to any solvents or chemicals other than insect repellants, pesticides or sunscreens either in your work or as a bystander to some other person's job? No 0
Yes 1 (57)

IF YES, please describe: _____

V. MISCELLANEOUS

97. Do you have any regular hobbies involving handling of solvents, paint thinners or any other chemicals? No 0
Yes 1 (58)

IF YES, please describe: _____

98. Have you had any symptoms which you specifically attribute to the use of insect repellent? No 0
Yes 1 (59)

IF YES, please describe: _____

VI. URINARY DATA

99. When did you last urinate? (FILL IN THE TIME) : (60-63)

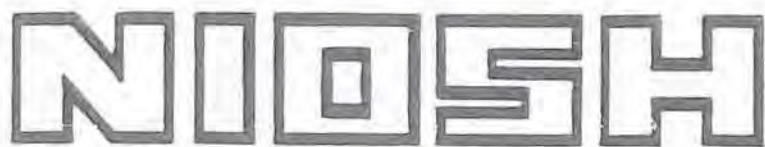
PLEASE LEAVE BLANK -- FOR CODERS ONLY: Urinary Volume (64-66)

Urinary Creatinine (67-69)

Urinary DEET (70-73)

Time of Urine Sample : (74-77)

CARD 05 (79-80)



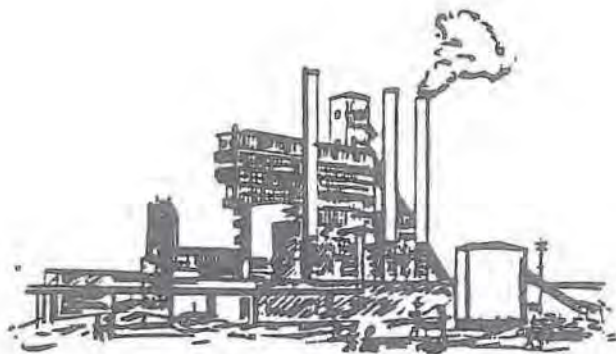
APPENDIX C

EVERGLADES NATIONAL PARK
2ND FOLLOW-UP STUDY

HETA 83-085

QUESTIONNAIRE

AUGUST 1985



U. S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service/Centers for Disease Control
National Institute for Occupational Safety and Health

EVERGLADES NATIONAL PARK
2ND FOLLOW-UP STUDY
HETA 83-085

QUESTIONNAIRE

THANK YOU FOR AGREEING TO PARTICIPATE IN THIS FOLLOW-UP STUDY TO THE SURVEY WE DID LAST SUMMER.

THIS YEAR WE WOULD LIKE YOU TO FILL OUT A QUESTIONNAIRE AND TAKE SOME SIMPLE TESTS WE WILL ADMINISTER.

IF YOU USE LITTLE OR NO INSECT REPELLANT, YOUR PARTICIPATION IS STILL JUST AS IMPORTANT. WE WILL BE COMPARING YOUR ANSWERS AND TEST RESULTS WITH THE RESULTS OF YOUR CO-WORKERS WHO USE A LOT OF REPELLANT. IF YOU DON'T PARTICIPATE, WE WILL HAVE NO ONE TO COMPARE.

WHEN YOU FINISH, GO ON TO THE NEXT STATION. PLEASE DO NOT TELL THE NIOSH INVESTIGATORS ADMINISTERING THE TESTS WHETHER YOU USE A LOT OR A LITTLE INSECT REPELLANT. (IT COULD SUBCONSCIOUSLY INFLUENCE THE WAY THEY SCORE YOUR TESTS). ONLY LATER, WHEN WE ANALYZE THE DATA, WILL WE PUT YOUR QUESTIONNAIRE ANSWERS TOGETHER WITH YOUR RESULTS ON THE TESTS.

(1-4)

I. PERSONAL DATA

Today's date: (5-10)
Month Day Year

Name: _____ (11-25)
Last name

_____ (26-40) _____ (41)
First name M. I.

Address: _____ (42-61)
Street

City _____ (62-76)

CARD | 0 | 1 | (79-80)

State (5-6) Zip code (7-11)

Telephone number: Home - - (12-21)
Area code

Work - - (22-31)
Area code

Date of birth: $\frac{\quad}{\text{Month}} - \frac{\quad}{\text{Day}} - \frac{\quad}{\text{Year}}$ (32-37)

Height  (38-40)

Weight (41-43)

II. SYMPTOMS

DURING JUST THE PAST TWO WEEKS, HOW MANY DAYS WOULD YOU SAY YOU HAVE NOTICED EACH OF THE FOLLOWING PROBLEMS? PLEASE INDICATE ALL SYMPTOMS YOU HAVE HAD DURING THE PAST TWO WEEKS, REGARDLESS OF THE CAUSE, UNLESS YOU KNOW THAT IT WAS CAUSED BY CONSUMPTION OF ALCOHOL.

(CIRCLE THE NUMBER OF DAYS. CIRCLE 00 IF YOU HAVE NOT NOTICED A PROBLEM)

	NUMBER OF DAYS															
1. Headache	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(44-45)
2. Watery/burning/ "pink"/itchy eyes	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(46-47)
3. Runny/stuffy nose	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(48-49)
4. Coughing spells	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(50-51)
5. Skin rash or blisters not related to trauma	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(52-53)
6. Chills or shakes	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(54-55)
7. Wheezing	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(56-57)
8. Chest pain	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(58-59)
9. Nausea or vomiting	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(60-61)
10. Fainting/dizziness	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(62-63)
11. Episodes of confusion or disorientation	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(64-65)
12. Loss of sensation of sweating	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(66-67)
13. Weakness	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(68-69)
14. Loss of appetite	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(70-71)
15. Muscle cramping	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(72-73)
16. Giddiness or light-headedness	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(74-75)
17. Trouble falling asleep or staying asleep	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	(76-77)

CARD 1021 (79-80)

IN GENERAL (NOT JUST DURING THE PAST TWO WEEKS) WOULD YOU SAY YOU ARE TROUBLED BY ANY OF THE FOLLOWING? AGAIN, REMEMBER THAT YOUR ANSWERS ARE CONFIDENTIAL. (CHECK NO OR YES)

- | | |
|--|--|
| 33. Do you tire more easily than other people your age, for the amount of activity you do? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (46) |
| 34. Do you often have to go back and check things you have done such as turn off the stove, lock the door, etc.? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (47) |
| 35. Are you less interested in sex than most other people of your age and sex? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (48) |
| 36. Do you have difficulty concentrating? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (49) |
| 37. Are you frequently confused or disoriented? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (50) |
| 38. Do you have trouble remembering things? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (51) |
| 39. Do your relatives notice that you have trouble remembering things? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (52) |
| 40. Do you frequently feel irritable for no particular reason? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (53) |
| 41. Do you feel depressed for no particular reason? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (54) |
| 42. Do you have palpitations of the heart even when you don't exert yourself? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (55) |
| 43. Do you often have to make notes to remember things? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (56) |
| 44. Do you generally find it hard to get the meaning from reading newspapers and books? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (57) |
| 45. Do you sometimes feel pressure in your chest? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (58) |
| 46. Do you perspire without any particular reason? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (59) |
| 47. Do you have a headache at least once a week? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (60) |
| 48. Do you often have painful tingling in your hands or feet? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (61) |
| 49. Do you have any problems with buttoning or unbuttoning your shirt? | No <input type="checkbox"/> 0
Yes <input type="checkbox"/> 1 (62) |

50. Do you ever feel "drunk" when you have not been drinking? No 0
Yes 1 (63)
51. Do you have to get up in the middle of the night to urinate? No 0
Yes 1 (64)
52. Have you ever been told by a doctor that you have diabetes? No 0
Yes 1 (65)
53. Have you been told by a doctor that you have had a urinary tract infection at any time in the past five years? No 0
Yes 1 (66)

THE NEXT SET OF QUESTIONS REFERS TO THE PAST FOUR WEEKS.

How often have you had any of the following conditions?
(CHECK ONLY ONE ANSWER FOR EACH QUESTION)

54. Cramps in muscles of arms or legs (Please check one only)
- 5-7 days/week 1
1-4 days/week 2
Less than one day/week 3 (67)
Never 4

55. Twitching of muscles of arms or legs (Please check one only)
- 5-7 days/week 1
1-4 days/week 2
Less than one day/week 3 (68)
Never 4

56. Do you need help getting out of a chair (Please check one only)
- 5-7 days/week 1
1-4 days/week 2
Less than one day/week 3 (69)
Never 4

57. Do you have difficulty opening screw top lids on jars (Please check 1 only)
- 5-7 days/week 1
1-4 days/week 2
Less than one day/week 3 (70)
Never 4

58. Tingling or "pins and needles" sensation in hands, arms, feet, or legs (Please check one only)
- 5-7 days/week 1
1-4 days/week 2
Less than one day/week 3 (71)
Never 4

CARD 103 (79-80)

59. Numbness (parts of your body "go to sleep" for no apparent reason) (Please check one only)

5-7 days/week	_____	1	
1-4 days/week	_____	2	
Less than one day/week	_____	3	(5)
Never	_____	4	

60. A burning sensation in arms or legs (Please check one only)

5-7 days/week	_____	1	
1-4 days/week	_____	2	
Less than one day/week	_____	3	(6)
Never	_____	4	

61. Pain in arms after work when resting (Please check one only)

5-7 days/week	_____	1	
1-4 days/week	_____	2	
Less than one day/week	_____	3	(7)
Never	_____	4	

62. Do you have to strain in order to start the urine flow? (Please check 1 only)

5-7 days/week	_____	1	
1-4 days/week	_____	2	
Less than one day/week	_____	3	(8)
Never	_____	4	

63. Do you have to push on your abdomen in order to start the urine flow or keep the urine flowing?
(Please check one only)

5-7 days/week	_____	1	
1-4 days/week	_____	2	
Less than one day/week	_____	3	(9)
Never	_____	4	

64. Do you have to rush to the rest room to urinate urgently?
(Please check one only)

5-7 days/week	_____	1	
1-4 days/week	_____	2	
Less than one day/week	_____	3	(10)
Never	_____	4	

III. HABITS

65. If a drink is 1 can or bottle of beer, 1 glass of wine or 1 cocktail or shot of liquor, then how many drinks do you have in a week, on the average? (Fill in appropriate number of drinks) (11-12)
66. How many drinks have you had in the past 24 hours? (13-14)
67. How many cups of coffee do you drink daily, on the average? (15-16)
68. How many cups of coffee have you drunk in the past twelve hours? (17-18)
69. How many cups of tea do you drink daily, on the average? (19-20)
70. How many cups of tea have you drunk in the past twelve hours? (21-22)
71. On the average, how many times do you urinate daily? (Fill in average number of times) (23-24)
72. During just the past two weeks have you taken any medications? No 0
(This includes over-the-counter preparations) Yes 1 (25)

IF YES, PLEASE LIST:

MEDICATION	DOSE	HOW OFTEN TAKEN	WHEN LAST TAKEN
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

 (26)

IV. CURRENT JOB INFORMATION

NOW I AM GOING TO ASK YOU SOME QUESTIONS ABOUT YOUR WORK AT EVERGLADES NATIONAL PARK.

73. Which job description best fits your work? (CHECK ONE)

Maintenance.....	01	
Ranger.....	02	
Technician.....	03	
Interpreter.....	04	
Researcher.....	05	
Biologist.....	06	(27-28)
Administrative.....	07	
Clerical.....	08	
Laborer.....	09	
Other (Please describe below).....	10	

74. Approximately what percentage of your work time do you spend outside in an area where you might be bitten by mosquitoes. (Circle a percentage between 000 and 100%).

000 010 020 030 040 050 060 070 080 090 100 (29-31)

THE NEXT SET OF QUESTIONS ASK ABOUT YOUR USE OF INSECT REPELLANT. INCLUDE EVENING AND WEEKEND USE IN YOUR ESTIMATES:

75. How many hours each week do you currently wear a bug jacket?
(FILL IN 000 IF YOU DON'T USE) # hours (32-33)

76. When was the last date that you treated your bug jacket with repellent?

 (34-39)
Month Day Year

77. Do you apply insect repellent to your skin or clothing? No 0
Yes 1 (40)

IF NO, GO TO QUESTION 88 ON PAGE 18. (SKIP QUESTIONS 78-87).

IF YES, PLEASE ANSWER QUESTIONS 78-87 ABOUT YOUR CURRENT USE OF INSECT REPELLANT BASED ON YOUR AVERAGE USE OVER THE PAST TWO WEEKS. INCLUDE EVENING AND WEEKEND USE.

78. Do you use Deep Woods Off lotion?..... No 0
Yes 1 (41)

IF YES:

A. What size container of Deep Woods Off lotion do you use? (CHECK 1 ONLY)

One ounce container 1
Two ounce container 2 (42)

B. Where do you apply Deep Woods Off lotion? (CHECK ONE ONLY)

Exclusively to skin 1
Mostly to skin, but also to clothing (or to bug jacket) 2
About equal amounts to skin and clothing (or to bug jacket) 3 (43)
Mostly to clothing (or to bug jacket) 4
Exclusively to clothing (or to bug jacket) 5

C. How many days does it take you to use up one container of
Deep Woods Off lotion, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (44-45)

D. How many times have you applied Deep Woods Off Lotion in
the last 24 hours?

(FILL IN 0|0| IF NONE APPLIED IN LAST 24 HOURS) (46-47)

E. How many days does it take you to use up one container of
Deep Woods Off lotion, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (48-49)

79. Do you use Off Spray?..... No 0
 Yes 1 (50)

IF YES:

A. What size container of Off Spray do you use? (CHECK ONE ONLY)

Six ounce container 1
 Twelve ounce container 2 (51)

B. Where do you apply Off Spray? (CHECK ONE ONLY)

Exclusively to skin 1
 Mostly to skin, but also to clothing (or to bug jacket) 2
 About equal amounts to skin and clothing (or to bug jacket) 3 (52)
 Mostly to clothing (or to bug jacket) 4
 Exclusively to clothing (or to bug jacket) 5

C. How many days does it take you to use up one container of Off Spray, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (53-54)

D. How many times have you applied Off Spray in the last 24 hours?

(FILL IN 0|0| IF NONE APPLIED IN LAST 24 HOURS) (55-56)

E. How many days does it take you to use up one container of Off Spray, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (57-58)

80. Do you use Cutter Lotion?..... No 0
Yes 1 (59)

IF YES:

A. What size container of Cutter Lotion do you use? (CHECK ONE ONLY)

One ounce container 1
Two ounce container 2 (60)

B. Where do you apply Cutter Lotion? (CHECK ONE ONLY)

Exclusively to skin 1
Mostly to skin, but also to clothing (or to bug jacket) 2
About equal amounts to skin and clothing (or to bug jacket) 3 (61)
Mostly to clothing (or to bug jacket) 4
Exclusively to clothing (or to bug jacket) 5

C. How many days does it take you to use up one container of Cutter Lotion, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (62-63)

D. How many times have you applied Cutter Lotion in the last 24 hours?

(FILL IN 0|0| IF NONE APPLIED IN LAST 24 HOURS) (64-65)

E. How many days does it take you to use up one container of Cutter Lotion, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (66-67)

81. Do you use Cutter Spray?..... No 0
 Yes 1 (68)

IF YES:

A. What size container of Cutter Spray do you use? (CHECK ONE ONLY)

Six ounce container 1
 Twelve ounce container 2 (69)

B. Where do you apply Cutter Spray? (CHECK ONE ONLY)

Exclusively to skin 1
 Mostly to skin, but also to clothing (or to bug jacket) 2
 About equal amounts to skin and clothing (or to bug jacket) 3 (70)
 Mostly to clothing (or to bug jacket) 4
 Exclusively to clothing (or to bug jacket) 5

C. How many days does it take you to use up one container of Cutter Spray, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (71-72)

D. How many times have you applied Cutter Spray in the last 24 hours?

(FILL IN 0|0| IF NONE APPLIED IN LAST 24 HOURS) (73-74)

E. How many days does it take you to use up one container of Cutter Spray, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (75-76)

CARD 0|4| (79-80)

82. Do you use Government Issue Lotion?..... No 0
Yes 1 (5)

IF YES:

A. Where do you apply Government Issue Lotion? (CHECK ONE ONLY)

Exclusively to skin 1
Mostly to skin, but also to clothing (or to bug jacket) 2
About equal amounts to skin and clothing (or to bug jacket) 3 (6)
Mostly to clothing (or to bug jacket) 4
Exclusively to clothing (or to bug jacket) 5

B. How many days does it take you to use up one container of Government Issue Lotion, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (7-8)

C. How many times have you applied Government Issue Lotion in the last 24 hours?

(FILL IN 0/0 IF NONE APPLIED IN LAST 24 HOURS) (9-10)

D. How many days does it take you to use up one container of Government Issue Lotion, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (11-12)

83. Do you use Government Issue Spray?..... No 0
Yes 1 (13)

IF YES:

A. Where do you apply Government Issue Spray? (CHECK ONE ONLY)

Exclusively to skin 1
Mostly to skin, but also to clothing (or to bug jacket) 2
About equal amounts to skin and clothing (or to bug jacket) 3 (14)
Mostly to clothing (or to bug jacket) 4
Exclusively to clothing (or to bug jacket) 5

B. How many days does it take you to use up one container of Government Issue Spray, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (15-16)

C. How many times have you applied Government Issue Spray in the last 24 hours?

(FILL IN 0/0 IF NONE APPLIED IN LAST 24 HOURS) (17-18)

D. How many days does it take you to use up one container of Government Issue Spray, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (19-20)

84. Do you use Muskol Lotion?..... No 0
Yes 1 (21)

IF YES:

A. What size container of Muskol Lotion do you use? (CHECK ONE ONLY)

One ounce container 1
Two ounce container 2 (22)

B. Where do you apply Muskol Lotion? (CHECK ONE ONLY)

Exclusively to skin 1
Mostly to skin, but also to clothing (or to bug jacket) 2
About equal amounts to skin and clothing (or to bug jacket) 3 (23)
Mostly to clothing (or to bug jacket) 4
Exclusively to clothing (or to bug jacket) 5

C. How many days does it take you to use up one container of Muskol Lotion, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (24-25)

D. How many times have you applied Muskol Lotion in the last 24 hours?

(FILL IN 0|0| IF NONE APPLIED IN LAST 24 HOURS) (26-27)

E. How many days does it take you to use up one container of Muskol Lotion, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (28-29)

85. Do you use Muskol Spray?..... No 0
Yes 1 (30)

IF YES:

A. What size container of Muskol Spray do you use? (CHECK ONE ONLY)

Six ounce container 1
Twelve ounce container 2 (31)

B. Where do you apply Muskol Spray? (CHECK ONE ONLY)

Exclusively to skin 1
Mostly to skin, but also to clothing (or to bug jacket) 2
About equal amounts to skin and clothing (or to bug jacket) 3 (32)
Mostly to clothing (or to bug jacket) 4
Exclusively to clothing (or to bug jacket) 5

C. How many days does it take you to use up one container of Muskol Spray, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (33-34)

D. How many times have you applied Muskol Spray in the last 24 hours?

(FILL IN 0|0| IF NONE APPLIED IN LAST 24 HOURS) (35-36)

E. How many days does it take you to use up one container of Muskol Spray, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (37-38)

86. Do you use Avon Skin So Soft Oil?..... No 0
 Yes 1 (39)

87. Do you use any other insect repellent?..... No 0
 Yes 1 (40)

IF YES:

A. What is the name of this other repellent? _____

B. What size container of this other repellent do you use? _____

C. Where do you apply this other repellent? (CHECK ONE ONLY)

	Exclusively to skin	<u> </u>	1	
	Mostly to skin, but also to clothing (or to bug jacket)	<u> </u>	2	
	About equal amounts to skin and clothing (or to bug jacket)	<u> </u>	3	(41)
	Mostly to clothing (or to bug jacket)	<u> </u>	4	
	Exclusively to clothing (or to bug jacket)	<u> </u>	5	

D. How many days does it take you to use up one container of this other repellent, based on your use over the past two weeks?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (42-43)

E. How many times have you applied this other repellent in the last 24 hours?

(FILL IN 0 0 IF NONE APPLIED IN LAST 24 HOURS) (44-45)

F. How many days does it take you to use up one container of this other repellent, based on your use over the past 24 hours?

(FILL IN SOME NUMBER BETWEEN 1 and 99 DAYS) (46-47)

88. Do you apply pesticides on the job? No 0
Yes 1 (48)

89. How many hours after arriving home do you usually shower and change clothes?
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 (49-50)

90. How often do you wash your hands at work before you eat? (Please check one)
Always 1
Usually 2
Sometimes 3 (51)
Seldom 4
Never 5

91. How often do you wash your hands at work before you smoke? (Please check one only)
Always 1
Usually 2
Sometimes 3 (52)
Seldom 4
Never 5
Non-smoker 6

92. Are you wearing a short sleeved shirt today? No 0
Yes 1 (53)

93. Did you wear a short sleeved shirt yesterday? No 0
Yes 1 (54)

94. Are you wearing a bug jacket today? No 0
Yes 1 (55)

95. Did you wear a bug jacket yesterday? No 0
Yes 1 (56)

96. In your present job, are you exposed to any solvents or chemicals other than insect repellants, pesticides or sunscreens either in your work or as a bystander to some other person's job? No 0
Yes 1 (57)

IF YES, please describe: _____

V. MISCELLANEOUS

97. Do you have any regular hobbies involving handling of solvents, paint thinners or any other chemicals? No 0
Yes 1 (58)

IF YES, please describe: _____

98. Have you had any symptoms which you specifically attribute to the use of insect repellent? No 0
Yes 1 (59)

IF YES, please describe: _____

VI. URINARY DATA

99. When did you last urinate? (FILL IN THE TIME) : (60-63)

PLEASE LEAVE BLANK -- FOR CODERS ONLY:

Urinary Volume	<u> </u> <u> </u> <u> </u> <u> </u>	(64-66)
Urinary Creatinine	<u> </u> <u> </u> <u> </u> <u> </u>	(67-69)
Urinary DEET	<u> </u> <u> </u> <u> </u> <u> </u>	(70-73)
Time of Urine Sample	<u> </u> : <u> </u> <u> </u> <u> </u>	(74-77)
	CARD <u>0</u> <u>5</u>	(79-80)

EVERGLADES NATIONAL PARK
2ND FOLLOW-UP STUDY
HETA 83-085

SLEEP QUESTIONNAIRE

NAME: _____

SUBJECT ID#: _____ (1-4)

I. GENERAL

NOTE: ALL QUESTIONS APPLY TO THE LAST 6 MONTHS ONLY.

DO YOU FEEL THAT YOU:

1. GET TOO LITTLE SLEEP AT NIGHT? No 0 Yes 1 (5)
2. GET TOO MUCH SLEEP AT NIGHT? No 0 Yes 1 (6)
3. HAVE YOU EVER HAD A POOR NIGHT'S SLEEP? No 0 Yes 1 (7)
4. WHAT TIME DO YOU USUALLY GO TO BED ON A WEEKDAY? : M (8-12)

INSTRUCTIONS: IN THE FOLLOWING QUESTIONS, CIRCLE THE MOST APPROPRIATE ANSWER.

- 1 = none, not at all or never
2 = slightly or just a few times
3 = moderately or sometimes
4 = fairly great or quite often
5 = a lot or always

HOW MUCH OF A PROBLEM DO YOU HAVE:

5. WITH GETTING TO SLEEP AT NIGHT? 1 2 3 4 5 (13)
6. BECAUSE OF WAKING UP DURING THE NIGHT? 1 2 3 4 5 (14)
7. WITH WAKING UP AND GETTING UP IN THE MORNING? 1 2 3 4 5 (15)
8. WITH NON-RESTORATIVE SLEEP? (NO MATTER HOW MUCH SLEEP YOU GET, YOU DON'T WAKE UP FEELING RESTED)? 1 2 3 4 5 (16)
9. WITH SLEEPINESS DURING THE DAY? (FEELING SLEEPY, STRUGGLING TO STAY AWAKE IN THE DAYTIME)? 1 2 3 4 5 (17)
10. WITH FATIGUE DURING THE DAY? (TIREDNESS, EXHAUSTION LETHARGY)? 1 2 3 4 5 (18)

II. SLEEP ONSET

11. HOW LONG DOES IT USUALLY TAKE YOU TO FALL ASLEEP AFTER DECIDING TO GO TO SLEEP? Hours Minutes (19-22)

12. HAVE YOU EVER HAD DIFFICULTY FALLING ASLEEP? 0 No 1 Yes (23)

INSTRUCTIONS: IN THE FOLLOWING QUESTIONS, CIRCLE THE MOST APPROPRIATE ANSWER.

1 = none, not at all or never
2 = slightly or just a few times
3 = moderately or sometimes
4 = fairly great or quite often
5 = a lot or always

WHEN FALLING ASLEEP OR DURING THE NIGHT, HOW OFTEN DO YOU:

13. FEEL UNABLE TO MOVE (PARALYZED)? 1 2 3 4 5 (24)

14. NOTICE THAT PARTS OF YOUR BODY STARTLE OR JERK? 1 2 3 4 5 (25)

15. EXPERIENCE RESTLESS LEGS (CRAWLING OR ACHING FEELINGS AND INABILITY TO KEEP LEGS STILL)? 1 2 3 4 5 (26)

16. EXPERIENCE VIVID, DREAM-LIKE SCENES (HALLUCINATIONS) EVEN THOUGH YOU KNOW THAT YOU ARE AWAKE? 1 2 3 4 5 (27)

17. EXPERIENCE ANY KIND OF PAIN OR PHYSICAL DISCOMFORT? 1 2 3 4 5 (28)

NOTE: Section III covers that period of an average day during which you normally sleep.

18. WHAT IS THE TOTAL NUMBER OF HOURS OF SLEEP THAT YOU USUALLY GET AT NIGHT? (DO NOT INCLUDE TIME SPENT AWAKE IN BED.) (29-30)

19. HAVE YOU EVER AWAKENED DURING THE NIGHT? 0 No 1 Yes (31)

IF "YES" TO QUESTION 19:

a. HOW MANY TIMES DO YOU WAKE DURING THE NIGHT? (32-33)

b. HOW LONG IS THE TYPICAL LONGEST WAKE? Hours Minutes (34-37)

c. IF YOU WAKE DURING A TYPICAL NIGHT, WHICH PART OF YOUR SLEEP PERIOD IS IT?

(1) FIRST THIRD 0 No 1 Yes (38)

(2) MIDDLE THIRD 0 No 1 Yes (39)

(3) LAST THIRD 0 No 1 Yes (40)

20. HOW MANY TIMES DO YOU GET OUT OF BED DURING A TYPICAL NIGHT'S SLEEP? (41-42)

INSTRUCTIONS: IN THE FOLLOWING QUESTIONS, CIRCLE THE MOST APPROPRIATE ANSWER.

- 1 = none, not at all or never
2 = slightly or just a few times
3 = moderately or sometimes
4 = fairly great or quite often
5 = a lot or always

HOW OFTEN DO YOU:

21. HAVE RESTLESS, DISTURBED SLEEP? 1 2 3 4 5 (43)

22. DISTURB THE SLEEP OF YOUR BED PARTNER? 1 2 3 4 5 (44)

HOW OFTEN DURING THE NIGHT DO YOU:

23. HAVE ASTHMA? 1 2 3 4 5 (45)

24. AWAKEN FROM SLEEP BECAUSE OF COUGHING, HEARTBURN, GAS OR REGURGITATION? 1 2 3 4 5 (46)

25. HAVE DREAMS OR NIGHTMARES ASSOCIATED WITH AWAKENINGS? 1 2 3 4 5 (47)

26. SNORE IN ANY WAY? 1 2 3 4 5 (48)

27. SNORE LOUDLY AND DISRUPTIVELY? 1 2 3 4 5 (49)

28. HOLD YOUR BREATH OR STOP BREATHING DURING SLEEP? 1 2 3 4 5 (50)

29. HAVE SOME OTHER BREATHING PROBLEM DURING SLEEP? 1 2 3 4 5 (51)

30. NOTICE THAT YOUR HEART POUNDS (BEATS STRONGLY), BEATS RAPIDLY OR BEATS IRREGULARLY (PALPITATIONS), DURING THE NIGHT? 1 2 3 4 5 (52)

31. DO YOU HAVE HIGH BLOOD PRESSURE?

0 ___ No

1 ___ Yes

(53)

INSTRUCTIONS: IN THE FOLLOWING QUESTIONS, CIRCLE THE MOST APPROPRIATE ANSWER.

- 1 = none, not at all or never
 2 = slightly or just a few times
 3 = moderately or sometimes
 4 = fairly great or quite often
 5 = a lot or always

HOW OFTEN DO YOU:

- | | | | | | | |
|--|---|---|---|---|---|------|
| 32. WALK IN YOUR SLEEP? | 1 | 2 | 3 | 4 | 5 | (54) |
| 33. TALK IN YOUR SLEEP? | 1 | 2 | 3 | 4 | 5 | (55) |
| 34. GRIND YOUR TEETH DURING YOUR SLEEP | 1 | 2 | 3 | 4 | 5 | (56) |
| 35. BANG YOUR HEAD (ON THE BED OR WALL) AND/OR MAKE
ROCKING-ROLLING MOVEMENTS DURING SLEEP? | 1 | 2 | 3 | 4 | 5 | (57) |
| 36. FALL OUT OF BED WHILE ASLEEP? | 1 | 2 | 3 | 4 | 5 | (58) |
| 37. AWAKEN FROM SLEEP SCREAMING, VIOLENT AND CONFUSED
(NIGHT TERRORS)? | 1 | 2 | 3 | 4 | 5 | (59) |
| 38. WET YOUR BED DURING YOUR ADULT YEARS? | 1 | 2 | 3 | 4 | 5 | (60) |
| 39. NOTICE YOUR LEGS TWITCH OR KICK DURING THE NIGHT
WHILE YOU ARE ASLEEP? | 1 | 2 | 3 | 4 | 5 | (61) |
| 40. HAVE A CONVULSION (FIT, SEIZURE, EPILEPSY)
DURING SLEEP? | 1 | 2 | 3 | 4 | 5 | (62) |
| 41. HAVE HEADACHES DURING THE NIGHT THAT DISTURB YOUR
SLEEP? | 1 | 2 | 3 | 4 | 5 | (63) |

QUESTION 42 FOR MEN ONLY:

- | | | | | | | |
|---|----------|-----------|---|---|---|------|
| 42. HAVE PROBLEMS WITH PAINFUL ERECTIONS DURING THE NIGHT? | 1 | 2 | 3 | 4 | 5 | (64) |
| 43. HOW MUCH DOES YOUR SLEEP-WAKE SCHEDULE DIFFER ON
WEEKENDS AS COMPARED TO WEEKDAYS? | 1 | 2 | 3 | 4 | 5 | (65) |
| 44. HOW VARIABLE (IRREGULAR) ARE YOUR BEDTIMES AND WAKE
TIMES? | 1 | 2 | 3 | 4 | 5 | (66) |
| 45. DO YOU FEEL THAT YOU HAVE INSOMNIA? | 0 ___ No | 1 ___ Yes | | | | (67) |

CARD 07 (79-80)

IV. DAYTIME FUNCTIONING

46. HOW MUCH OF A PROBLEM DO YOU HAVE WITH SLEEPINESS
DURING THE DAYTIME?

1 2 3 4 5 (5)

DURING THE LAST 6 MONTHS, HAVE YOU FALLEN ASLEEP OR STRUGGLED TO STAY AWAKE
(FOUGHT SLEEP) IN THE FOLLOWING SITUATIONS:

	<u>FALLEN ASLEEP</u>			<u>STRUGGLED TO STAY AWAKE (FOUGHT SLEEP)</u>		
47. DURING INTERCOURSE?	0 ___ No	1 ___ Yes	(6)	0 ___ No	1 ___ Yes	(7)
48. EATING FOOD (MEALS)?	0 ___ No	1 ___ Yes	(8)	0 ___ No	1 ___ Yes	(9)
49. ON THE TELEPHONE?	0 ___ No	1 ___ Yes	(10)	0 ___ No	1 ___ Yes	(11)
50. IN A CONVERSATION WITH ANOTHER PERSON WHILE YOU ARE AT WORK?	0 ___ No	1 ___ Yes	(12)	0 ___ No	1 ___ Yes	(13)
51. TRAVELING (CAR, BUS OR TRAIN)?	0 ___ No	1 ___ Yes	(14)	0 ___ No	1 ___ Yes	(15)
52. ATTENDING A PERFORMANCE (LECTURES, FILMS, OPERAS, PLAYS)?	0 ___ No	1 ___ Yes	(16)	0 ___ No	1 ___ Yes	(17)
53. WATCHING TELEVISION?	0 ___ No	1 ___ Yes	(18)	0 ___ No	1 ___ Yes	(19)
54. LISTENING TO THE RADIO OR STEREO?	0 ___ No	1 ___ Yes	(20)	0 ___ No	1 ___ Yes	(21)

INSTRUCTIONS: IN THE FOLLOWING QUESTIONS, CIRCLE THE MOST APPROPRIATE ANSWER.

- 1 = none, not at all or never
- 2 = slightly or just a few times
- 3 = moderately or sometimes
- 4 = fairly great or quite often
- 5 = a lot or always

55. HOW OFTEN HAVE YOU HAD AUTOMOBILE ACCIDENTS OR NEAR
MISSES CAUSED BY SLEEPINESS?

1 2 3 4 5 (22)

56. HOW OFTEN DO ANY OF YOUR SLEEP-WAKE PROBLEMS SEEM TO
GO IN CYCLES OR RECUR AT REGULAR INTERVALS?

1 2 3 4 5 (23)

57. HOW MANY NAPS (ACTUALLY FALLING ASLEEP) DO YOU TAKE DURING A USUAL
WEEKDAY?

 (24-25)

V. OTHER DAYTIME BEHAVIOR

INSTRUCTIONS: IN THE FOLLOWING QUESTIONS, CIRCLE THE MOST APPROPRIATE ANSWER.

- 1 = none, not at all or never
2 = slightly or just a few times
3 = moderately or sometimes
4 = fairly great or quite often
5 = a lot or always

HOW OFTEN DO YOU:

58. HAVE EPISODES OF SUDDEN MUSCULAR WEAKNESS (PARALYSIS OR INABILITY TO MOVE) WHEN LAUGHING, ANGRY OR IN OTHER EMOTIONAL SITUATIONS? 1 2 3 4 5 (26)

59. DO YOU FEEL THAT YOU ARE EXCESSIVELY SLEEPY DURING THE DAYTIME? 0 ___ No 1 ___ Yes (27)

HOW OFTEN HAVE YOU USED ANY OF THE FOLLOWING TO HELP YOU GO TO SLEEP OR WITHIN ONE HOUR OF GETTING INTO BED?

60. MARIJUANA? 1 2 3 4 5 (28)

61. ALCOHOL? 1 2 3 4 5 (29)

DO YOU TAKE ANY TYPE OF MEDICATION AT THE PRESENT TIME TO HELP YOU:

62. WITH A PROBLEM WITH YOUR SLEEP? 0 ___ No 1 ___ Yes (30)

63. TO STAY ALERT AND/OR AWAKE DURING THE DAY? 0 ___ No 1 ___ Yes (31)

| IF "YES" TO QUESTION 62 OR 63: |

a. WAS THE MEDICATION PRESCRIBED FOR YOU BY A PHYSICIAN? 0 ___ No 1 ___ Yes (32)

HAVE YOU EVER OBTAINED A PRESCRIPTION FOR MEDICATION FROM A PHYSICIAN TO HELP YOU:

64. WITH A PROBLEM WITH YOUR SLEEP? 0 ___ No 1 ___ Yes (33)

65. TO STAY ALERT AND/OR AWAKE DURING THE DAY? 0 ___ No 1 ___ Yes (34)

VI. MEDICATIONS

HAVE YOU TAKEN ANY OF THE FOLLOWING MEDICATIONS IN THE LAST 12 MONTHS:

INSTRUCTIONS: FOR THE FOLLOWING QUESTIONS, CIRCLE
YOUR ANSWER FOR EACH QUESTION, USING:

"0" for no and "1" for yes.

	<u>TO AID SLEEP</u>	<u>TO COMBAT SLEEPINESS</u>	<u>ANY OTHER REASON</u>
66. ASPIRIN	0 1 (35)	0 1 (36)	0 1 (37)
67. OTHER ANALGESICS (DARVON, TYLENOL, CODEINE)	0 1 (38)	0 1 (39)	0 1 (40)
68. NASAL DECONGESTANTS (PILLS, SPRAYS)	0 1 (41)	0 1 (42)	0 1 (43)
69. TRANQUILIZERS OR MUSCLE RELAXANTS (VALIUM, LIBRIUM, MEPROBAMATE, MILTOWN, EQUANIL, MELLARIL, THORAZINE, STELAZINE, HALDOL, NAVANE, PROLOXIN)	0 1 (44)	0 1 (45)	0 1 (46)
70. ANTIDEPRESSANT (ELAVIL, TOFRANIL, SINEQUAN)	0 1 (47)	0 1 (48)	0 1 (49)
71. BARBITURATE SEDATIVES (SLEEPING PILLS, SECONAL, TUINAL, NEMBUTAL, PHENOBARBITAL)	0 1 (50)	0 1 (51)	0 1 (52)
72. CON-BARBITURATE SEDATIVES (SLEEPING PILLS, PLACIDYL, QUAALUDE, NOLUDAR, DALMANE, CHLORAL HYDRATE, BENADRYL)	0 1 (53)	0 1 (54)	0 1 (55)
73. PHARMACY <u>NON-PRESCRIPTION</u> SLEEPING PILLS (COMPOZ, DORMIN, SOMINEX, NYTOL)	0 1 (56)	0 1 (57)	0 1 (58)
74. ANTI-ALLERGY MEDICATIONS (TEDRAL, AMINOPHYLLIN, ANTIHISTAMINES, CORTISONE)	0 1 (59)	0 1 (60)	0 1 (61)
75. STIMULANTS (RITALIN, AMPHETAMINES, DIET PILLS)	0 1 (62)	0 1 (63)	0 1 (64)
76. <u>MILD</u> STIMULANTS (COFFEE, TEA)	0 1 (65)	0 1 (66)	0 1 (67)
77. PHARMACY <u>NON-PRESCRIPTION</u> STIMULANTS (NO-DOZ, VIVARIN, CAFFEINE TABLETS, EYE OPENERS, TIREND, BAN-DROWZ)	0 1 (68)	0 1 (69)	0 1 (70)
78. ANY OTHER MEDICATIONS	0 1 (71)	0 1 (72)	0 1 (73)

CARD 008 (79-80)

VII. SCHEDULE

79. WHAT TIME DO YOU USUALLY TRY TO GO TO SLEEP:

- | | | |
|--------------|--------------------|---------|
| a. WEEKDAYS | _ _ : _ _ _ _ M | (5-9) |
| b. WEEKENDS | _ _ : _ _ _ _ M | (10-14) |
| c. VACATIONS | _ _ : _ _ _ _ M | (15-19) |

80. WHAT TIME DO YOU USUALLY HAVE YOUR FINAL AWAKENING:

- | | | |
|--------------|--------------------|---------|
| a. WEEKDAYS | _ _ : _ _ _ _ M | (20-24) |
| b. WEEKENDS | _ _ : _ _ _ _ M | (25-29) |
| c. VACATIONS | _ _ : _ _ _ _ M | (30-34) |

81. IN THE LAST 6 MONTHS HAVE YOU WORKED ROTATING SHIFTS OR NIGHT WORK?

0 No 1 Yes (35)

82. WHAT HOURS DO YOU WORK?

FROM: |_|_| : |_|_|_|_| M TO: |_|_| : |_|_|_|_| M (36-45)

83. HOW OFTEN DO YOU HAVE A PROBLEM WITH YOUR SLEEP OR DAYTIME FUNCTIONING BECAUSE YOU TRAVEL ACROSS TIME ZONES?

1 2 3 4 5 (46)

84. IF YOUR SLEEP-WAKE BEHAVIOR IS NOT ADEQUATELY COVERED BY THE ABOVE QUESTIONS, BRIEFLY DESCRIBE THE NATURE OF YOUR SLEEP-WAKE BEHAVIOR AND LIST ANYTHING ELSE NOT COVERED WHICH ESPECIALLY INTERFERS WITH YOUR SLEEP OR WAKEFULNESS.

CARD |0|9| (79-80)

APPENDIX E

EVERGLADES NATIONAL PARK
2ND FOLLOW-UP STUDY
HETA 83-085

PSYCHIC DISTRESS QUESTIONNAIRE

NAME: _____

SUBJECT ID#: (1-4)

INTERVIEWER: (Ask for each problem): HAVE YOU BEEN BOTHERED BY (problem) IN THE PAST 12 MONTHS?

(If "yes", ask): HAVE YOU BEEN BOTHERED BY THIS PROBLEM A LOT IN THE PAST 12 MONTHS?

IN THE PAST 12 MONTHS:

(IF YES):

IN THE PAST 12 MONTHS:

<u>NO</u> <u>NEVER</u>	<u>YES</u>	<u>USED</u> <u>TO</u>			<u>A</u> <u>LOT</u>	<u>NOT</u> <u>MUCH</u>	
0	1	2	(5)	1. NOT HAVING MUCH INTEREST IN THINGS	1	2	(6)
0	1	2	(7)	2. FEELING HOPELESS ABOUT THE FUTURE	1	2	(8)
0	1	2	(9)	3. WITHOUT A GOOD REASON, FEELING SAD OR CRYING	1	2	(10)
0	1	2	(11)	4. FEELING BLUE, DOWN IN THE DUMPS OR DEPRESSED	1	2	(12)
0	1	2	(13)	5. FEELING TOO TIRED TO DO THINGS	1	2	(14)
0	1	2	(15)	6. HAVING TROUBLE GETTING UP IN THE MORNING & FACING THE DAY, EVEN WHEN I HAVE HAD ENOUGH SLEEP	1	2	(16)
0	1	2	(17)	7. HAVING TROUBLE GETTING MYSELF GOING	1	2	(18)
0	1	2	(19)	8. LOSING MY APPETITE OR LOSING WEIGHT WITHOUT TRYING	1	2	(20)

IN THE PAST 12 MONTHS:

(IF YES):

IN THE PAST 12 MONTHS:

<u>NO</u> <u>NEVER</u>	<u>YES</u>	<u>USED</u> <u>TO</u>		<u>A</u> <u>LOT</u>	<u>NOT</u> <u>MUCH</u>
0	1	2 (21)	9. FEELING AFRAID OR SCARED WITHOUT GOOD REASON	1	2 (22)
0	1	2 (23)	10. WORRYING TOO MUCH	1	2 (24)
0	1	2 (25)	11. FEELING NERVOUS, FIDGETY, TENSE	1	2 (26)
0	1	2 (27)	12. FEELING KEYED UP OR OVER-EXCITED	1	2 (28)
0	1	2 (29)	13. HAVING TO AVOID CERTAIN PLACES, PEOPLE OR THINGS BECAUSE THEY FRIGHTEN ME	1	2 (30)
0	1	2 (31)	14. BEING SO RESTLESS I CANNOT SIT STILL	1	2 (32)
0	1	2 (33)	15. HAVING TROUBLE REMEMBERING THINGS	1	2 (34)
0	1	2 (35)	16. HAVING TROUBLE MAKING UP MY MIND	1	2 (36)
0	1	2 (37)	17. BEING BOTHERED BY SOME UNIMPORTANT THOUGHT THAT KEEPS RUNNING THROUGH MY MIND	1	2 (38)
0	1	2 (39)	18. BEING BOTHERED BY MY HEART POUNDING OR RACING	1	2 (40)
0	1	2 (41)	19. HANDS TREMBLING	1	2 (42)
0	1	2 (43)	20. HOT OR COLD SPELLS	1	2 (44)
0	1	2 (45)	21. TIGHTNESS OR TENSION IN THE NECK, BACK OR OTHER MUSCLES	1	2 (46)
0	1	2 (47)	22. FEELING FAINT OR DIZZY	1	2 (48)
0	1	2 (49)	23. NERVOUS STOMACH UPSETS	1	2 (50)
0	1	2 (51)	24. BEING EASILY UPSET, IRRITATED OR ANNOYED	1	2 (52)

CARD 111 (79-80)

IN THE PAST 12 MONTHS:

(IF YES):

IN THE PAST 12 MONTHS:

<u>NO NEVER</u>	<u>YES</u>	<u>USED TO</u>			<u>A LOT</u>	<u>NOT MUCH</u>	
0	1	2	(5)	25. GETTING ANGRY OVER THINGS THAT ARE NOT REALLY TOO IMPORTANT	1	2	(6)
0	1	2	(7)	26. EATING MORE AND GAINING WEIGHT	1	2	(8)
0	1	2	(9)	27. TROUBLE STAYING ASLEEP OR WAKING TOO EARLY	1	2	(10)
0	1	2	(11)	28. SLEEPING MORE THAN I USUALLY DO	1	2	(12)
0	1	2	(13)	29. TROUBLE FALLING ASLEEP	1	2	(14)
0	1	2	(15)	30. THINKING, TALKING OR DOING THINGS MORE SLOWLY THAN USUAL	1	2	(16)
0	1	2	(17)	31. FEELING GUILTY OR BLAMING MYSELF FOR THINGS	1	2	(18)
0	1	2	(19)	32. LOSS OF SEXUAL INTEREST OR PLEASURE	1	2	(20)
0	1	2	(21)	33. FEELING DEPRESSED WHEN I FIRST GET UP BUT BETTER AS TIME GO ON	1	2	(22)
0	1	2	(23)	34. TROUBLE CONCENTRATING	1	2	(24)
0	1	2	(25)	35. TROUBLE CATCHING MY BREATH EVEN WHEN I AM NOT DOING ANYTHING	1	2	(26)
0	1	2	(27)	36. SWEATING WHEN I AM NOT EXERCISING	1	2	(28)
0	1	2	(29)	37. SPELLS OF FEAR OR PANIC	1	2	(30)
0	1	2	(31)	38. FEELING AFRAID IN OPEN SPACES OR ON THE STREET	1	2	(32)
0	1	2	(33)	39. TEMPER OUTBURSTS	1	2	(34)
0	1	2	(35)	40. WANTING TO HURT SOMEBODY OR SMASH SOMETHING	1	2	(36)
0	1	2	(37)	41. FEELINGS EASILY HURT	1	2	(38)
0	1	2	(39)	42. FEELING CRITICAL OF OTHERS	1	2	(40)
0	1	2	(41)	43. CRYING EASILY OR CRYING A LOT	1	2	(42)

CARD 1|2| (79-80)

APPENDIX F

Descriptions of Tests of Neuroperformance

GAIT TEST - The subject was instructed to run in place (as fast as possible) for 10 seconds on a pad (40 x 30 cm) interfaced to an Apple IIe computer which recorded the number of foot falls.

BALANCE TEST - The subject was instructed to try to maintain his/her balance on a small teeter board (55.5 X 11cm) for a total of 90 seconds. Mercury switches on the board were connected to the computer and registered if the board varied more than 10 degrees in either direction from horizontal. The subject received visual feedback from a computer screen regarding whether or not he was balanced. A circle with a horizontal line indicated a "balanced" condition. A circle with a line tilted 45 degrees off of horizontal represented the "unbalanced" condition. Total number of seconds in the "balanced" state were recorded for each subject.

MEMORY SCANNING TEST - A modification of the Sternberg Memory Scanning Test^{10,11}, this task consists of 24 trials in which the subject must indicate whether a number was a member of a previously presented "target" group. The set sizes of the "target" group were 1,2,3,and 4. Response time was then regressed on set size for each individual. The resulting slope corresponds to the memory-scanning time (i.e., msec/digit) and the intercept approximates the total cognitive encoding and motor processing time, i.e., the psychomotor component of this function. The intercept has been shown to correlate moderately well with other measures of complex reaction time (Continuous Performance Test (CPT) response time: $r=.39$ and Symbol-Digit latency: $r=.31$).³⁸

SANTA ANA TEST - This test of manual dexterity requires the subject to remove pegs from a board, rotate the pegs 180 degrees and then replace them in the board. The total number of pegs rotated in 30 seconds was recorded.

IN THE PAST 12 MONTHS:

(IF YES):

IN THE PAST 12 MONTHS:

<u>NO NEVER</u>	<u>YES</u>	<u>USED TO</u>			<u>A LOT</u>	<u>NOT MUCH</u>	
0	1	2	(5)	25. GETTING ANGRY OVER THINGS THAT ARE NOT REALLY TOO IMPORTANT	1	2	(6)
0	1	2	(7)	26. EATING MORE AND GAINING WEIGHT	1	2	(8)
0	1	2	(9)	27. TROUBLE STAYING ASLEEP OR WAKING TOO EARLY	1	2	(10)
0	1	2	(11)	28. SLEEPING MORE THAN I USUALLY DO	1	2	(12)
0	1	2	(13)	29. TROUBLE FALLING ASLEEP	1	2	(14)
0	1	2	(15)	30. THINKING, TALKING OR DOING THINGS MORE SLOWLY THAN USUAL	1	2	(16)
0	1	2	(17)	31. FEELING GUILTY OR BLAMING MYSELF FOR THINGS	1	2	(18)
0	1	2	(19)	32. LOSS OF SEXUAL INTEREST OR PLEASURE	1	2	(20)
0	1	2	(21)	33. FEELING DEPRESSED WHEN I FIRST GET UP BUT BETTER AS TIME GO ON	1	2	(22)
0	1	2	(23)	34. TROUBLE CONCENTRATING	1	2	(24)
0	1	2	(25)	35. TROUBLE CATCHING MY BREATH EVEN WHEN I AM NOT DOING ANYTHING	1	2	(26)
0	1	2	(27)	36. SWEATING WHEN I AM NOT EXERCISING	1	2	(28)
0	1	2	(29)	37. SPELLS OF FEAR OR PANIC	1	2	(30)
0	1	2	(31)	38. FEELING AFRAID IN OPEN SPACES OR ON THE STREET	1	2	(32)
0	1	2	(33)	39. TEMPER OUTBURSTS	1	2	(34)
0	1	2	(35)	40. WANTING TO HURT SOMEBODY OR SMASH SOMETHING	1	2	(36)
0	1	2	(37)	41. FEELINGS EASILY HURT	1	2	(38)
0	1	2	(39)	42. FEELING CRITICAL OF OTHERS	1	2	(40)
0	1	2	(41)	43. CRYING EASILY OR CRYING A LOT	1	2	(42)

CARD 112 (79-80)

APPENDIX F

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