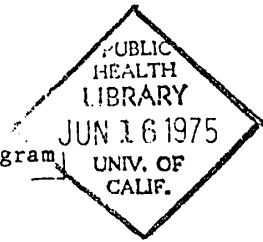


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TITLE OF STUDY: [Epidemiologic Studies Program]
CONTRACT NO.: 68-01-2949
CONTRACT REPORT NO.: 40 - 1st Quarterly Report, 1975
PERIOD OF PERFORMANCE: December 15, 1974 - March 15, 1975
DATE OF PUBLICATION: April 15, 1975
PRIMARY CONTRACTOR California State Department
of Health
PROJECT DIRECTOR: Ephraim Kahn, M.D.
PRINCIPAL INVESTIGATOR: William F. Serat, Ph.D.

Credit Line and Disclaimer

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WORK UNIT C-1 - STUDY OF CHRONIC ADVERSE EFFECTS OF PESTICIDES.
INVESTIGATION OF KIDNEY AND PULMONARY FUNCTION
AND OCULAR DAMAGE AMONG COMMERCIAL WEED
SPRAYMEN EXPOSED TO PARAQUAT

(Under the direction of Donald C. Mengle)

During this quarter, in addition to contacting and recruiting participants for the study and making arrangements for examination sites and staff, we have, together with Dr. Donald Morgan at the Iowa Center, greatly modified and developed the overall study. Changes made include the protocol, occupational and medical history questionnaires with current symptomatology, and a physical examination form.

Because the protocol is such a departure from the one developed at the time of the negotiation of our contract last fall and described only in part in our last Annual Report, we include it in this Report as follows.

CALIFORNIA STUDY OF THE EFFECTS OF OCCUPATIONAL
PARAQUAT EXPOSURE

Located generally between Modesto and Visalia, California and available to the Epidemiologic Studies Program based at the State Health Department in Berkeley, California, are several commercial firms increasingly engaged in the application of Paraquat -CL, hereafter referred to as "paraquat" as a herbicide and cotton defoliant. Workers employed at these firms apply paraquat to weeds and mature crops on an almost daily basis for periods approximately five to ten weeks per year. During the remainder of the year, they formulate and apply various other chemicals, to which they probably have significant personal exposure. Even so, the degree of personal exposure to paraquat is probably as high among these workers as can be found in the United States. Availability of this worker population represents a valuable opportunity to assess the health hazards of occupational exposure to this widely used herbicide.

The toxicology of paraquat has developed largely around the consequences of either ingestion or injection of the chemical in animals and man (accidents and suicides). The principal adverse effects occurring as a result of occupational exposure are corneal opacities (from splashing the material in the eye), yellowing and degeneration of the fingernails (again as a consequence of direct contact), and nosebleeds (presumably due to irritation of the nasal mucous membranes). Despite the extraordinary injuries to lungs, liver, and kidneys that occur in animals dosed or injected with paraquat, and the usually fatal human consequences of renal and pulmonary insufficiencies following accidental or suicidal ingestion, these devastating manifestations have not been reported among workers occupationally exposed to paraquat spray. This safety record seems remarkable in view of the rather casual protective measures ordinarily used by commercial applicators. It remains to be seen whether physical examination and testing for subclinical injury to lungs and other vital tissues will reveal acute or chronic injury. Exhaustive examinations to detect clinical illness, biochemical aberrations and pathophysiologic changes of a subtle nature will be the objective of this epidemiologic investigation.

The California Program intends to recruit fifty paraquat-exposed workers who will be matched with fifty controls with respect to age ($\pm$ 5 years), sex (all males), race, socio-economic status, and use of tobacco, alcohol, drugs and medications. Control subjects to be matched with paraquat-exposed workers will be drawn from among agricultural chemical applicators without history of paraquat exposure. Many applicators working for county highway departments and park and recreational agencies as well as mosquito abatement agencies have not - and will not ever be working with or near the materials.

Specific test procedures to be administered are as follows:

1. Documentation of paraquat exposure: Because of the strong polarity of this compound and its consequent strong binding to plasma and tissue proteins, documentation of exposure by analysis of plasma and urine may be difficult or impossible. Nonetheless, analyses of plasma and urine will be done to establish whether absorption of paraquat in the course of occupational exposure actually generates levels of paraquat excretion reported to occur in cases of suicidal or accidental ingestion of the compound. If it appears that urinary concentrations in workers occupationally exposed are consistently below the analytical detection level, it will be necessary to document personal exposure by analysis of respirator filters and pads attached to the body surface. In addition, photographic records of the chemical application circumstances may well serve to document the potentialities for personal contact and inhalation of the chemical.
2. Occupational and medical histories, together with a review of symptoms and current symptomatology: Each participant will be interviewed to establish the duration, including dates and the intensity of paraquat usage during his lifetime, and to identify and establish similar information, again including dates, about other forms of pesticides and other chemical exposure. Medical histories will be obtained, together with information about current and prior use of tobacco, alcohol, medications and drugs. A lifetime review of symptoms will be obtained from each participant and will include frequency and current condition within the week of the examination. Symptomatology to be explored in relation to paraquat exposure includes nosebleed, sore throat, cough, hemoptysis, chest pain, visual impairment, anosmia, yellowing and degeneration of the fingernails, dermatitis, and eye irritation.
3. Physical observations of the exposed and control workers will concentrate on injuries to eyes, upper and lower respiratory tracts, skin, and fingernails. Ocular examination will record occurrences of corneal opacities, chronic conjunctivitis, and early degenerative changes in the lens. The lungs will be examined for the presence of wheezes, rales and percussive dullness. The findings from these examinations will be systematically recorded on control and on paraquat-exposed subjects.
4. Hematologic, enzymatic and biochemical testing and urinalysis: This will be done primarily to determine whether occupational exposure to paraquat causes injury to the liver or kidneys resembling the severe toxic effects that follow paraquat ingestion. Quantitative albumin excretion, qualitative tests for sugar and ketones, and examination for formed elements in the urinary sediment will be carried out. Serum enzyme activities, SGOT, LDH, and alkaline phosphatase, will serve to detect hepatocellular injury. The serum bilirubin, total protein, and albumin will be measured as indices of chronic liver injury.

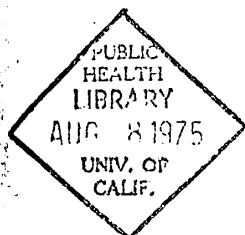
5. PA and lateral chest x-rays of paraquat-exposed and control subjects will be taken in such a way that the roentgenographic technique and film interpretations are done similarly for controls and paraquat-exposed workers. Examiners will not have prior knowledge of the exposure status of the subjects whose films they are viewing. Films will first be examined individually to detect and record abnormalities. They will then be re-examined in groups of exposed vs. controls to determine whether there are roentgenographic characteristics of the separate groups that are peculiar to the paraquat-exposed subjects. Pulmonary function tests will be conducted upon each participant and will include the determination of forced expiratory volume in one second.
6. Cytogenetic studies: One blood sample will be taken from each of the paraquat-exposed and control subjects, properly treated, and shipped to the Michigan Project for cytogenetic examination. Samples from these subjects will offer an ideal opportunity to test for chromosomal aberrations in subjects exposed to this highly active chemical.

Duration of the California Paraquat Study and Opportunities for Prospective Epidemiology.

Completion of the study proposal thus far outlined will require at least two years. In the course of the third year, the paraquat and control study groups should be expanded numerically to the greatest possible extent, without recruiting less exposed individuals. At this point, a retesting of both paraquat-exposed and controls should be undertaken using the same test methods employed in the initial study. This will permit some judgement as to whether the intervening seasonal exposures have resulted in adverse effects not detectable following the more limited exposure. **There is, of course, no reason why a cohort of this type should not be monitored for adverse health effects indefinitely into the future. As the period of follow-up is extended, the likelihood of finding adverse effects improves steadily.**

###

TITLE OF STUDY: Epidemiologic Studies Program
CONTRACT NO.: 68-01-2949
CONTRACT REPORT NO.: 41 - 2nd Quarterly Report, 1975
PERIOD OF PERFORMANCE: March 15 - June 15, 1975
DATE OF PUBLICATION: July 25, 1975
PRIMARY CONTRACTOR: California State Department
of Health
PROJECT DIRECTOR: Ephraim Kahn, M.D.
PRINCIPAL INVESTIGATOR: William F. Serat, Ph.D.



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The worker informed investigators that he was aware of the toxicity of the material, especially when ingested, and that he was sure he had not swallowed any of what splashed into his mouth. Urine samples taken 6 hours after the accident and at various time since, have all been negative for paraquat at a sensitivity of 0.1 ppm. Kidney and liver function tests have also been normal.

7. Currently we are investigating the fatal crash of an agricultural aircraft pilot in Kern County to see if the "nervous disorder" his friends and co-workers described as marking his final days before the crash could have been related to the effect of the highly toxic organophosphate insecticides he was applying and the extremely long hours he was flying.

8. We investigated a case involving the superficial burning of the face and lips of a 50 year old female flagger who was injured when rapidly shifting wind blew the Carbyne pesticide onto her face.

WORK UNIT C-1 - STUDY OF CHRONIC ADVERSE EFFECTS OF PESTICIDES.
INVESTIGATION OF KIDNEY AND PULMUNARY FUNCTION
AND OCULAR DAMAGE AMONG COMMERCIAL WEED
SPRAYMEN EXPOSED TO PARAQUAT

(Under the direction of Donald C. Mengle)

During this period, at the request of the Human Effects Monitoring Branch of EPA, we have prepared and sent Bi-Weekly Reports of our progress on this chronic effect study to Dr. Dale Parrish at the Iowa Pesticide Epidemiologic Studies Center with copies to the project officer. The following report is taken largely from sections of those Bi-Weekly Reports.

The study calls for examination of 50 workers with heavy paraquat exposure and exactly the same examination of 50 spraymen with no history of paraquat exposure. Tests will include a complete physician's examination concentrating on those signs described as occurring in chronic or acute paraquat poisoning. An occupational and medical history questionnaire with a review of current symptomatology will be administered to each participant. Also, each person will receive a chest X-ray, both P.A. and lateral, pulmonary function determination, a slit lamp eye examination, and a battery of appropriate clinical biochemical tests. Levels of pesticide exposure will be determined by monitoring paraquat levels in respirator filters and cloth patches to be worn outside work clothing, as well as by urinary paraquat determinations.

For the clinical chemistry work on both chronic studies, bid requests were sent to three California laboratories, as is a state requirement. Only one laboratory responded and we worked with this department's Contracts Coordination Unit in Sacramento to draw up the subcontract.

We continued to locate and recruit study participants and make arrangements for conducting the physical examinations in the Fresno Area. During

one bi-weekly period, managers of five mosquito abatement districts and a regional office of the State Highway Department (Caltrans) were visited to explain the study and review their organization's past and probable future paraquat usage. The managers agreed to allow employees who volunteer to attend the examination during normal working hours. The workers have no history of paraquat exposure and since governmental organizations in California have largely abandoned its use, they will remain exposed to a variety of pesticides, but not paraquat. Paraquat exposed workers were previously recruited.

Arrangements were made with a Fresno hospital to provide the necessary examination facilities and staff to conduct much of the examination. Dr. Roger Larson, Medical Director at Valley Medical Center, whose physicians and staff will be conducting much of the examination has asked that additional pulmonary function tests be conducted. These include carbon monoxide diffusion capacity, lung volume, blood gases, and conduct by their own staff of one second forced expiratory volume and the mid expiratory flow rate. We contacted Dr. Morgan regarding value and need for these additional tests. We considered and rejected several of them early in our contract negotiations. Our rejection was because, although we thought the tests worthwhile, we felt medical facilities, expertise, and interest were not available in the Fresno area where our paraquat exposed population was located. After learning now that such are available and very interested, we contacted Dr. Wes Miller to see about availability of funds to do the additional tests.

As pointed out above, Dr. Larson of the Valley Medical Center, Fresno, wished to also include the blood gas determination in this pulmonary workup. We learned that the \$3,000 additional funds to take care of the blood gas tests were not available. When two of us became test "subjects for the arterial taps needed, it took 15 minutes of probing to find the artery in one case and a black and blue wrist with swelling produced on the other; it became evident that the test would be eliminated from the design. We felt that such an aftermath would mean many of our volunteer participants would not return for future examinations.

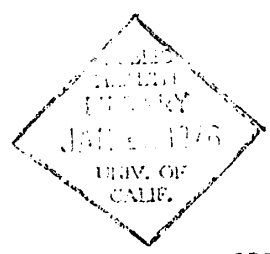
We have recruited 57 volunteer participants with a history of heavy paraquat exposure and a matching number without. The extras (above 50) are there in case of attrition due to vacations or if for any other reason there are some no-show. In any case, we will not exceed 100 study participants. Presently, we are awaiting completion of our sub-contractual arrangements with the Valley Medical Center Foundation of Fresno for the conduct of the additional pulmonary function tests. The pulmonary function tests they will be conducting, and for which we are presently preparing a separate \$3,000 contract with the medical group, includes the following determinations:

1. Timed vital capacity to include:
 - a) Mid expiratory flow-rate
 - b) FEV - 1 second
2. Closed circuit residual volume determination
3. Single breath CO diffusion capacity

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CONTRACT PROGRESS REPORT

TITLE OF STUDY: EPIDEMIOLOGIC STUDIES PROGRAM
CONTRACT NUMBER: 68-02-0719
CONTRACT REPORT NUMBER: 42 - ANNUAL REPORT 1975
PERIOD OF PERFORMANCE: SEPTEMBER 15, 1974 -
SEPTEMBER 15, 1975
DATE SUBMITTED: NOVEMBER 15, 1975
PRIMARY CONTRACTOR: CALIFORNIA STATE DEPARTMENT
OF HEALTH
PROJECT DIRECTOR: EPHRAIM KAHN, M.D.
PRINCIPAL INVESTIGATOR: WILLIAM F. SERAT, PH.D.



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WORK UNIT C-1 STUDY OF CHRONIC ADVERSE EFFECTS OF PESTICIDES
INVESTIGATION OF KIDNEY AND PULMONARY FUNCTION
AND OCULAR DAMAGE AMONG COMMERCIAL WEED
SPRAYMEN EXPOSED TO PARAQUAT

(Under the direction of Donald C. Mengle)

During this contract year, we began by completely revising the protocols for both chronic studies at the direction of Drs. Don Morgan and Dale Parrish at the Iowa Pesticide Epidemiologic Studies Center. The number of participants in the protocol grew to more than double those we originally proposed. The amount of physical and clinical testing on each subject also increased very substantially.

Because the protocols are such a departure from the ones developed last fall and described in our last annual report we include them in this report which follows:

CALIFORNIA STUDY OF THE EFFECTS OF OCCUPATIONAL
PARAQUAT EXPOSURE

Located generally between Modesto and Visalia, California and available to the Epidemiologic Studies Program (ESP) based at the State Health Department in Berkeley, California, are several commercial firms increasingly engaged in the application of Paraquat-CL, hereafter referred to as "paraquat" as a herbicide and cotton defoliant. Workers employed at these firms apply paraquat to weeds and mature crops on an almost daily basis for periods approximately five to ten weeks per year. During the remainder of the year, they formulate and apply various other chemicals, to which they probably have significant personnel exposure. Even so, the degree of personnel exposure to paraquat is probably as high among these workers as can be found in the United States. Availability of this worker population represents a valuable opportunity to assess the health hazards of occupational exposure to this widely used herbicide.

The toxicology of paraquat has developed largely around the consequences of either ingestion or injection of the chemical in animals and man (accidents and suicides). The principal adverse effects occurring as a result of occupational exposure are corneal opacities (from splashing the material in the eye, yellowing and degeneration of the fingernails (again as a consequence of direct contact), and nosebleeds (presumably due to irritation of the nasal mucous membranes). Despite the extraordinary injuries to lungs, liver, and kidneys that occur in animals dosed or injected with paraquat, and the usually fatal human consequences of renal and pulmonary insufficiencies following accidental or suicidal ingestion, these devastating manifestations have not been reported among workers occupationally exposed to paraquat spray. This safety record seems remarkable in view of the rather casual protective measures ordinarily used by commercial applicators. It remains to be seen whether physical examination and testing for subclinical injury to lungs and other vital tissues will reveal acute or chronic injury. Exhaustive

examinations to detect clinical illness, biochemical aberrations and pathophysiologic changes of a subtle nature will be the objective of this epidemiologic investigation.

The California program intends to recruit 50 paraquat-exposed workers who will be matched with 50 controls with respect to age ($\pm$ years), sex (all males), race, socio-economic status, and use of tobacco, alcohol, drugs and medications. Control subjects to be matched with paraquat-exposed workers will be drawn from among agricultural chemical applicators without history of paraquat exposure. Many applicators working for county highway departments and park and recreational agencies as well as mosquito abatement agencies have not--and will not ever be working with or near the material

Specific test procedures to be administered are as follows:

1. Documentation of paraquat exposure: Because of the strong polarity of this compound and its consequent strong binding to plasma and tissue proteins, documentation of exposure by analysis of plasma and urine may be difficult or impossible. Nonetheless, analyses of plasma and urine will be done to establish whether absorption of paraquat in the course of occupational exposure actually generates levels of paraquat excretion reported to occur in cases of suicidal or accidental ingestion of the compound. If it appears that urinary concentrations in workers occupationally exposed are consistently below the analytical detection level, it will be necessary to document personal exposure by analysis of respirator filters and pads attached to the body surface. In addition, photographic records of the chemical application circumstances may well serve to document the potentialities for personal contact and inhalation of the chemical.
2. Occupational and medical histories, together with a review of symptoms and current symptomatology: Each participant will be interviewed to establish the duration, including dates and the intensity of paraquat usage during his lifetime, and to identify and establish similar information, again including dates, about other forms of pesticides and other chemical exposure. Medical histories will be obtained, together with information about current and prior use of tobacco, alcohol, medications and drugs. A lifetime review of symptoms will be obtained from each participant and will include frequency and current condition within the week of the examination. Symptomatology to be explored in relation to paraquat exposure includes nosebleed, sore throat, cough, hemoptysis, chest pain, visual impairment, anosmia, yellowing and degeneration of the fingernails, dermatitis, and eye irritation.
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5. PA and lateral chest X-rays of paraquat-exposed and control subjects will be taken in such a way that the roentgenographic technique and film interpretations are done similarly for controls and paraquat exposed workers. Examiners will not have prior knowledge of the exposure status of the subjects whose films they are viewing. Films will first be examined individually to detect and record abnormalities. They will then be re-examined in groups of exposed versus controls to determine whether there are roentgenographic characteristics of the separate groups that are peculiar to the paraquat-exposed subjects. Pulmonary function tests will be conducted upon each participant and will include the determination of forced expiratory volume in one second.
6. Cytogenetic studies: One blood sample will be taken from each of the paraquat-exposed and control subjects, properly treated, and shipped to the Michigan Project for cytogenetic examination. Samples from these subjects will offer an ideal opportunity to test for chromosomal aberrations in subjects exposed to this highly active chemical.

Duration of the California Paraquat Study and Opportunities for Prospective Epidemiology.

Completion of the study proposal thus far outlined will require at least two years. In the course of the third year, the paraquat and control study groups should be expanded numerically to the greatest possible extent, without recruiting less exposed individuals. At this point, a retesting of both paraquat-exposed and control should be undertaken using the same test methods employed in the initial study. This will permit some judgement as to whether the intervening seasonal exposures have resulted in adverse effects not detectable following the more limited exposure. There is, of course, no reason why a cohort of this type should not be monitored for adverse health effects indefinitely into the future. As the period of follow-up is extended, the likelihood of finding adverse effects improves steadily.

Bi-Weekly Reports

During this year, at the request of the Human Effects Monitoring Branch of EPA, we have prepared and sent Bi-Weekly Reports of our progress on this chronic effect study to Dr. Dale Parrish at the Iowa Pesticide Epidemiologic Studies Center with copies to the project officer. In turn we received copies of monthly progress reports made by Dale Parrish of activities in each chronic effects study conducted by the five Epidemiologic Studies Programs involved in the chronic approach. These reports, which are sent by Dr. Parrish to Dr. Jack Griffith, Chief, HEMB, accurately describe our progress in conducting these studies.

The following section then, is taken largely from portions of our Bi-Weekly reports:

For the clinical chemistry work on both chronic studies, bid requests were sent to three California laboratories, as is a state requirement. Only one laboratory responded and we worked with this department's Contracts Coordination Unit in Sacramento to draw up the subcontract.

We located and recruited study participants and made arrangements for conducting the physical examinations in the Fresno area. During one

period, managers of five mosquito abatement districts and a regional office of the State Highway Department (Caltrans) were visited to explain the study and review their organization's past and probable future paraquat usage. The managers agreed to allow employees who volunteer to attend the examination during normal working hours. The workers have no history of paraquat exposure and since governmental organizations in California have largely abandoned its use, they will remain exposed to a variety of pesticides, but not paraquat. Paraquat exposed workers were previously recruited.

Arrangements were made with a Fresno hospital to provide the necessary examination facilities and staff to conduct much of the examination. Dr. Roger Larson, Medical Director at Valley Medical Center, whose physicians and staff conducted much of the examination asked that additional pulmonary function tests be conducted. These include carbon monoxide diffusion capacity, lung volume, blood gases, and conduct by their own staff of one second forced expiratory volume and the mid expiratory flow rate. We contacted Dr. Morgan regarding value and need for these additional tests. We considered and rejected several of them early in our contract negotiations. Our rejection was because, although we thought the tests worthwhile, we felt medical facilities, expertise, and interest were not available in the Fresno area where our paraquat exposed population was located. After learning that such were available and very interested, we contacted Dr. Wes Miller to see about availability of funds to do the additional tests.

As pointed out above. Dr. Larson of the Valley Medical Center, Fresno, wished to also include the blood gas determination in this pulmonary workup. We learned that the \$3,000 additional funds to take care of the blood gas tests were not available. When two of us became test "subjects for the arterial taps needed, it took 15 minutes of probing to find the artery in one case and a black and blue wrist with swelling produced on the other; it became evident that the test would be eliminated from the design. We felt that such an aftermath would mean many of our volunteer participants would not return for future examinations.

We have recruited 57 volunteer participants with a history of heavy paraquat exposure and a matching number without. The extras (above 50) were there in case of attrition due to vacations or if for any other reason there are some no-show. In any case, we will not exceed 100 study participants. We completed our sub-contractual arrangements with the Valley Medical Center Foundation of Fresno for the conduct of the additional pulmonary function tests. The \$3,000 contract with the medical group, includes the following determinations:

1. Timed vital capacity to include:
 - a) Mid expiratory flow-rate
 - b) FEV - 1 second
2. Closed circuit residual volume determinations
3. Single breath CO diffusion capacity

As part of the chromosome sub-study within our chronic studies, our trial shipments to Michigan indicate that several days were needed to get airmail

special delivery packages from Fresno to the laboratory in East Lansing. We and the laboratory technologist on the other end, Joyce Carter, worked to shorten the time. Sets of instructions for collecting blood and urine together with the kits including vacutainers (4 blood samples per patient) and urine tubes (2 samples, 1 timed) were distributed to the laboratory at the hospital in Fresno where we conducted the physical examinations. Schedules with the Radiology Department, Chest Clinic and Eye Clinic at the hospital were worked out for X-rays, pulmonary function, and slit lamp examinations.

Because the hospital did not hire any additional help, and is adding our participants into their work load, they will only examine a maximum of five men per day. We scheduled therefore 20 sessions, starting with Wednesday, August 6th. Times for starting the examinations which take about three hours each vary from 7:AM to 6:PM depending mostly upon when the 100 participants are able to attend. Some are being given time off by their managers, some are taking vacation time and others, about a third we had hoped could come on their own time after work at sessions scheduled for either 4:30 PM or 6:PM. It was not possible to arrange with the hospital for either Saturday or Sunday examinations.

The ophthalmologist doing the eye examination including the slit lamp test informed me during the week of the 4th of August, that, contrary to what the Chief of Medical Services had told me, he would not perform those examinations after 2:30 PM. This meant re-scheduling more than half of our participants. Those eye tests are a very important part of the study and include: visual acuity, observations for nystagmus, extraocular movements and slit lamp examination for corneal opacities, degenerative changes, edema, aqueous flare, corneal thickness, burns and the conjunctiva.

Staff members of the California project are conducting the occupational and medical interviews with assistance from the staff of this department's Fresno Pesticide Accident Reporting Study.

Blood and urine samples collected as part of the study are shipped overnight by U.S. mail to Solano Laboratory in Berkeley with which we have sub-contracted for the analytical work. Service is excellent in fact it is fantastic! The laboratory staff performs the analysis the morning following the examination of the preceeding day and then mails the result to our Berkeley office so they arrive less than 48 hours after the examination was conducted and the samples collected. In case any serious conditions are noted in the laboratory work, we are notified at once by phone.

While conducting examinations in Fresno one afternoon we were so notified by the laboratory that a participant examined the preceeding day had evidence of severe liver injury. Following the protocol described in our Participant Voluntary Consent Form, a copy of which is attached, the participant, who had not given us the name of a physician was notified. A hospital appointment was made for three days later and our full examination results placed in the hands of the attending physicians in advance of the appointment.

To date, 71 workers have been examined by us at the Valley Medical Center in Fresno. The remaining 29 workmen who were exposed to Paraquat as cotton defoliators will be examined in October. Cotton defoliation for this

year has only recently begun in the southern San Joaquin Valley. It is ten days to two weeks late because of a very cold California spring and only a moderately hot summer. Trips into the Fresno County area are scheduled to observe Paraquat application by these workmen and to obtain a photographic record of their activities as well as to verify their exposures using chemical analysis of respirator pads and cloth patches taped to the workers' outer clothing.

Results from the X-ray and pulmonary function tests conducted under contract with the staff of the Valley Medical Center are beginning to arrive at our office. With the receipt of these, according to our understanding with each worker examined, we are starting to mail copies of each man's examination record to the physician listed by him on the Consent form.

Mr. Min Lee, who is no longer with our group, spent considerable time developing a method for analysis of Paraquat in urine and in running urine samples last spring from sprayers involved in killing winter weeds with Paraquat. No residues were found even in persons heavily exposed, and, together with Dr. Don Morgan, we developed other method of verification of exposure using analysis of respirator pads and cloth patches, as well as photographic records of various application procedures.

Forms

In addition to the questionnaires and forms for medical histories, occupational histories and the physical examination which were necessary to develop for both chronic studies, and then have approved by the Iowa Center, several others were required. The Voluntary Participation Consent Form was approved, along with our entire study protocols and designs, by this department's Committee for the Protection of Human Subjects. A sample set of most of the forms developed for the Paraquat Study is enclosed with this report.

DEPT OF HEALTH



August 1, 1975

Dear Manager:

Enclosed are instructions and forms to be completed by the pesticide study participants from your organization that we will be seeing in a physical examination on _____ at Valley Medical Center in Fresno. Please see that each participant receives his packet as soon as possible. We greatly appreciate your encouragement, cooperation and interest in this very important study.

Sincerely yours,

Donald C. Mengle
Research Specialist III
Community Studies on Pesticides

DEPARTMENT OF HEALTH

1001 WAY
SACRAMENTO



August 15, 1975

Dear Mr.

Thank you for becoming a volunteer participant in our study of the health of persons with a history of exposure to Paraquat and of a matching group of non-exposed workers. In this study you will receive a complete physical examination once each year. As most of you know, this study is being conducted at no cost to you by the Community Studies on Pesticides of the Department of Health, through the interest and resources of the Epidemiologic Studies Program of the Federal Government.

You should report to the Valley Medical Center in Fresno at _____ on _____. Valley Medical Center is a four floor hospital located near the corner of Cedar Avenue and Ventura Avenue (also called Kings Canyon Road). The best parking is in the large asphalt general parking lot located at the corner. Please see the enclosed diagram of the hospital area. If you are scheduled to begin before 8:00 A.M. or after 3:30 P.M. there are usually parking spaces on the street to the north and to the west of the hospital.

Please report for the beginning of your examination to the Eye Clinic, located in the clinic area of the hospital. See diagram attached.

At this point please make sure your name tag is on and you will be identified as a study participant and the examination will begin.

To the examination please bring the following (but if you do forget, extra copies are available at the examination room):

1. The enclosed two copies of the Consent Form. Please read and fill in the requested information before coming to the examination. You and the examiner will sign both copies and you will be given one copy while we keep the other.
2. The enclosed name tag. Put your name on it and wear it where it can be easily seen when you come into the hospital.

Case ID: 220300429

CHSA-00318526

3. The enclosed diagram of the hospital area.

Once you are in the hospital, if you have difficulty finding the Eye Clinic, inquire using the information phones located throughout the building.

In the meantime, if you have any questions about the examination, please contact myself or Dr. William Serat at our Berkeley office (call collect) at (415) 843-7900 Ext 535. I may also be contacted at or through the Fresno Office of the State Health Department at (209) 291-6676.

We look forward to seeing you soon in Fresno.

Sincerely yours,

Donald C. Mengle
Research Specialist III
Community Studies on Pesticides

COMMUNITY STUDIES ON PESTICIDES
State Department of Health
Berkeley, California 94704

Voluntary Participation in Pesticide Study
Consent Form

I, _____, a volunteer participant, agree to permit specimens of my blood and urine to be taken, a lung function test, chest X-ray, and eye examination to be given, and to submit myself to a routine physical examination by the Studies' physicians for research purposes. The study has been explained to me and I understand its value and its nature which is to be the determination of possible adverse effects from exposure to Paraquat.

I further authorize the Study physicians to make available to _____, M.D. whose address is _____ any medical information which in the interest of my health warrants his or her professional attention.

I understand that in this study which is scheduled to last from three to five years, that my participation is strictly voluntary and that I may withdraw from the study at any time without fear of reprisal.

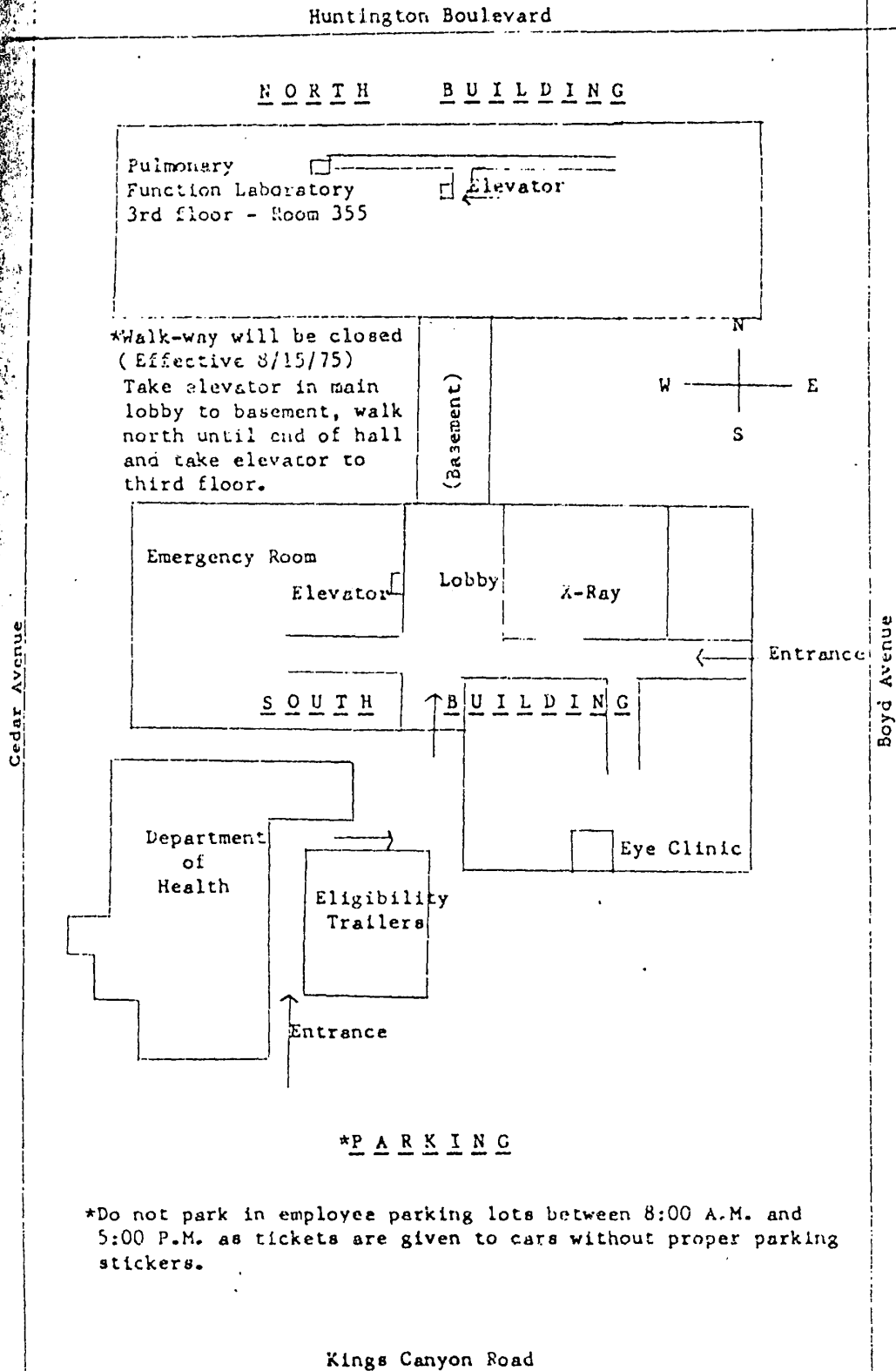
I understand that if I do not give the name and address of a physician above, that in case any serious medical condition is noted, that I will be so notified as soon as possible.

I understand that such notification will advise me to make an appointment with a physician of my choice and to inform the Community Studies on Pesticides in order that a copy of the record of this examination may be placed in the hands of that physician prior to the date of that appointment.

I further understand that the entire record of this examination is a confidential medical information and becomes property of the examining physician(s) and the Community Studies on Pesticides, and that I may at any time direct a copy of that record to be sent to any physician of my choice by informing in writing the Community Studies on Pesticides, State Department of Health 2151 Berkeley Way Berkeley, CA 94704.

Participant's signature: _____ Date: _____

Examiner's signature: _____ Date: _____



ALSO PLEASE NOTE: For those of you coming to the examination from outside the Fresno metropolitan area, we will reimburse you for your driving expenses at the rate of 15¢ per mile, but not to exceed \$10.00 per person. So if you are coming from a greater distance (Firebaugh, San Joaquin, Visalia, etc.), try to travel with another participant from your company and share expenses.

After the examination fill out and mail the form:

(cut here)

Name _____ Examination Date _____

Miles at 15¢ per mile _____

Cost \$ _____ (not to exceed \$10.00, Signature _____

Per person).

Mail to:

Donald C. Mengle
Community Studies on Pesticides
2151 Berkeley Way
Berkeley, CA 94704

CALIFORNIA COMMUNITY STUDIES OF PESTICIDES

OCCUPATIONAL HISTORY AND RECORD OF PESTICIDE EXPOSURE

(Use with all participants in Paraquat chronic exposure study)

Participant's Name _____	Name of Study <u>PARAQUAT</u>
Participant's Address _____	Interview Date _____ Month Day Year
_____	Interviewer's Name _____
Participant's Phone Number _____	Source of Data (Check as many as apply)
Date of Birth _____ Month Day Year	Participant _____
Sex _____ Race _____ Marital Status _____	Relative _____
Present Employer _____	Employer _____
Employer's Address _____	Employment Records _____
_____	Other _____

1. Do you currently have any other job(s), either part-time or full-time?
yes___ no___ If yes, complete the following:

Other Employers	Address	Start		To
		Mo.	Yr.	
_____	_____	_____	_____	<u>Present</u>
_____	_____	_____	_____	<u>Present</u>

2. Starting with your present employment, list in reverse chronological order all occupations back for approximately five years. Occupational names should be specific (for example: ground applicator, mixer-loader or "swamper", agricultural pilot, shoe salesman, office worker, insecticide formulator, etc.). Include any part-time work, especially if it involved toxic materials. Identify general classes of toxic materials (for example: solvents, pesticides, corrosives, dusts, and gases) you used or were exposed to in the course of each occupation.

	<u>Occupation</u>	<u>Start</u>		<u>To</u>		<u>Toxic Materials</u>
		<u>Mo.</u>	<u>Yr.</u>	<u>Mo.</u>	<u>Yr.</u>	
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						

1. What specific chemicals have you used or been exposed to at your present job or jobs? (List common names of pesticides and solvents. If only brand name is known, record it and interviewer should look up common name later.)

[illegible]

4. List major pesticides and solvents you have used or been exposed to other than at work. (List common names. If only brand name is known, record it, and interviewer should look up common name later.)

Name	Form (e.g., dust, liquid)	Date Last Used		Number Years Used	Average Number Days Used per Year
		Mo.	Yr.		

5. When working with pesticides, how often do you: (Mark "x" by correct answer.)

Always Sometimes Never

☐	☐	☐	Use mask or respirator? (specify type _____)
☐	☐	☐	Use protective shoes or boots?
☐	☐	☐	Use rubber gloves?
☐	☐	☐	Wear rubber suit on job?
☐	☐	☐	Wear an apron on job?
☐	☐	☐	Change clothes before leaving work?
☐	☐	☐	Wear same hat on job and at home?
☐	☐	☐	Shower at work before going home?
☐	☐	☐	Wash your hands before lunch?
☐	☐	☐	Stay upwind from spray apparatus?
☐	☐	☐	Use other protective measures on job? Describe _____

6. Describe the clothes and shoes you wear or wore when working with Paraquat:

7. Describe the equipment you use or used when working with Paraquat (type of ground sprayer, aircraft, mixing and loading device, closed system, flagging, etc.):

Describe the protective equipment or protective clothing you wear or wore when working with Paraquat (respirator, rubber or plastic suit, apron, hat, gloves, boots, or anything similar): _____

9. How would you describe your work with Paraquat? (Check one answer in each section.)

- A. 1. Only a few minutes at a time _____
2. Several hours at a time _____
3. Something between the above _____
- B. 1. Only on occasional days _____
2. Several days in certain weeks _____
3. Something between the above _____

10. Circle the names of the months in the last year in which you estimate that you worked with Paraquat for more than five days:

January February March April May June July August September
October November December

11. Additional comments on occupational history: _____

12. Dates on which participant's urinary Paraquat levels were monitored and values for Paraquat concentration:

<u>Date</u>	<u>Urinary Paraquat, ppm</u>
_____	_____
_____	_____
_____	_____
_____	_____

1. Dates on which participant's serum Paraquat levels were monitored and values for Paraquat concentration:

<u>Date</u>	<u>Serum Paraquat, ppm</u>
_____	_____
_____	_____
_____	_____

2. Key to photographic record of Paraquat application by participant:

<u>Date Picture was Taken</u>	<u>Photo File Number</u>	<u>Activity</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

3. Dates of monitoring participant's work environment for Paraquat. Indicate type of device worn (either respirator pad or cloth patch worn outside clothing). Indicate activity and length of time device was worn while working with Paraquat.

<u>Date</u>	<u>Type of Device Worn</u>	<u>Location on Body Device was Worn</u>	<u>Time Worn in Hours</u>	<u>Activity</u>	<u>Paraquat in mg</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

7/28/75

Case ID: 220300429

CIUSA-00318535

CALIFORNIA COMMUNITY STUDIES OF PESTICIDES
PHYSICAL AND NEUROLOGICAL EXAMINATION RECORD

(Use with all participants in the Paraquat chronic exposure study)

Participant's Name _____ Name of Study PARAQUAT

MAID Number

--	--	--	--	--	--	--	--	--	--

 Date of Examination _____
Month Day Year

VITAL SIGNS

Examiner's Name _____

1. Height _____ inches (to the nearest inch, without shoes)
2. Weight _____ lbs. (to the nearest pound, without shoes or coat)
3. Temperature _____ °F
4. Pulse _____ per minute
5. Respiration _____ per minute
6. Blood pressure (sitting, record both arms if one is abnormal)

Right: Systolic _____ Diastolic _____

Left: Systolic _____ Diastolic _____

(For each category below, mark "x" in space next to item if abnormality is detected and describe in space provided. Mark "✓" if examined and normal. Line out name of item when not tested.)

GENERAL APPEARANCE

1. Hydration _____ 2. Comfort _____ 3. Acute distress _____ 4. Development _____
5. Nourishment _____ 6. Chronic distress _____ 7. Other _____

Describe any abnormality noted _____

SKIN

1. Dermatitis___ (describe type, location and severity)_____
- _____
1. Hypertrichosis___ Location (describe)_____
1. Cyanosis___ 4. Plethora___
1. Pigmentation disturbance___ (describe type, location and severity)_____
- _____
1. Spider nevi___
1. Other___ (describe)_____
- _____

HAIR

1. Yellowing___ 2. Deterioration___ 3. Other___ (describe)_____
- _____

HEAD

1. Hair___ 2. Scalp___ 3. Other___ (describe)_____
- _____

EARS

1. Pinna___ 2. External Canal___ 3. Tympanic membrane___ 4. Other___
- (describe)_____

NECK

1. Thyroid___ 2. Masses___ 3. Other___ (describe)_____
- _____
- _____

ENT

1. Obstruction__ 2. Mucosa__ 3. Congestion__ (describe)_____

4. Evidence of irritation

a. Acute__ (describe)_____

b. Chronic__ (describe)_____

5. Other__ (describe)_____

MOUTH

1. Lips__ 2. Gums__ 3. Tongue__ 4. Pharynx__ (evidence of inflammation)

5. Other__ (describe)_____

BREASTS

1. Gynecomastia__ 2. Other__ (describe)_____

LUNGS

1. Fremitus__ 2. Percussion__ 3. Rubs__ 4. Breath sounds__ 5. Rales__
6. Rhonchi__ 7. Wheezes__ 8. Other__

(describe)_____

HEMODYNAMIC

HEART

1. PMI___ 2. Sounds___ 3. Rhythm___ 4. Murmurs___ 5. Rubs___
6. Thrills___ 7. Other___

(describe)_____

VESSELS

1. Peripheral pulses___ 2. Venous distention___ 3. Other___

(describe)_____

ABDOMEN

1. Masses___ 2. Tenderness___ 3. Organomegaly___ 4. Other___

(describe)_____

GENITOURINARY

1. CVA tenderness___ 2. Genitalia___ 3. Other___ (describe)_____

LYMPH NODES

1. Cervical___ 2. Auxiliary___ 3. Epitrochlear___ 4. Inguinal___

5. Other___ (describe)_____

CRANIAL NERVES

I Detection of peppermint___

VII 1. Facial Movements___ 2. Atrophy___ 3. Sugar and salt tasting___

4. Other___ (describe)_____

REFLEXES

1. Biceps___ 2.

Other___ (describe)_____

SENSORY

1. Touch___ 2. Temperature___ 3. Vibration___ 4. Stereognosis___

5. Proprioception___ 6. Other___

(describe)_____

CHEST X-RAY Do P.A. and Left Lateral
(Use X-Ray Interpretation Form)

PULMONARY FUNCTION Do According to Separate Contract
(Use Pulmonary Function Sheet)

EYE EXAMINATION

1. Visual acuity___ 2. Nystagmus___ 3. Extraocular movements___

SLIT LAMP EXAMINATION

1. Corneal opacities___ 2. Degenerative changes___ 3. Edema___
4. Aqueous flare___ 5. Corneal thickness___ 6. Burns___ 7. Conjunctiva___

7/28/75

Case ID: 220300429

CUSA-00318540

CALIFORNIA COMMUNITY STUDIES OF PESTICIDES

MEDICAL HISTORY AND SYMPTOMATOLOGY

(Use with all participants in Paraquat and pentachlorophenol chronic exposure studies)

Participant's Name _____ Name of Study _____

Participant's Address _____ Interview Date _____
Month Day Year

Interviewer's Name _____

Date of Birth _____
Month Day Year

MEDICAL HISTORY

1. Check in the appropriate column if any doctor ever told you you had, or if you think you have had any of the following health problems. Indicate month and year of onset and termination. Check in last column if you believe condition is present at time of this interview:

Condition	Yes	Uncertain	Onset Mo./Yr.	Termination Mo./Yr.	Currently Present
1. Anemia: specify type					
2. Arthritis: specify type					
3. Bronchitis					
4. Cataracts					
5. Glaucoma					
6. Chronic conjunctivitis					
7. Pterygium					
8. Other eye problems: specify _____					
9. Chloracne					
10. Cyst or wen					
11. Chronic dermatitis					
12. Other skin problems: specify _____					
13. Colitis					
14. Diabetes					
15. Emphysema					
16. Encephalitis or meningitis					
17. Epilepsy or convulsions					
18. Goiter					

Condition	Yes	Uncertain	Onset Mo./Yr.	Termination Mo./Yr.	Currently Present
19. Heart ailment: specify _____					
20. High blood pressure					
21. Hyperthyroidism					
22. Hypothyroidism					
23. Intestinal parasites or worms					
24. Kidney ailment: specify _____					
25. Liver ailment: specify _____					
26. Nervous condition or breakdown					
27. Pneumonia: specify type _____					
28. Tuberculosis					
29. Other lung ailments: specify _____					
30. Rhinitis					
31. Sinus problems					
32. Chronic sore throat					
33. Stomach ulcer					
34. Stroke					
35. Other condition(s) not mentioned above _____ _____ _____					

3. Have you been hospitalized in the past three years (including surgery)? If yes, please list below:

<u>Year</u>	<u>Duration in Days</u>	<u>Diagnosis</u>	<u>Was Surgery Performed</u>	
_____	_____	_____	yes ___	no ___
_____	_____	_____	yes ___	no ___
_____	_____	_____	yes ___	no ___
_____	_____	_____	yes ___	no ___

1. Have you had other medical care or seen a doctor in the past year? If yes, please list below:

<u>Month</u>	<u>Diagnosis</u>
_____	_____
_____	_____
_____	_____
_____	_____

2. Are you currently taking any medications or drugs? yes___ no___ If so, what medications or drugs are you taking:_____

3. List any other medications or drugs taken during the last year:

From _____	To _____	Name _____
From _____	To _____	Name _____
From _____	To _____	Name _____
From _____	To _____	Name _____
From _____	To _____	Name _____

6. Do you have any allergies? If yes, list below:

Medicines: _____ Foods: _____

Pesticides: _____ Plants, animals, dust: _____

Other allergies: _____

SYMPTOM REVIEW

7. Please check if you have any of the following symptoms. If so, indicate frequency of occurrence. Check in last column if symptoms have been present within the last week.

Symptoms	Yes	Uncertain	Once	Occasionally	Frequently	Continuously	Currently
1. Fatigue							
2. Fever							
3. Excessive sweating							
4. Night sweats							
5. Unusual tiredness or exhaustion							
6. Weight gain ____ lbs. in last year							
7. Weight loss ____ lbs. in last year							
8. Asthma							
9. Headaches							
10. Difficulty hearing							
11. Ringing in the ears							
12. Excessive tearing							
13. Irritation or burning of eyes							
14. Blurring or loss of vision							
15. Other eye problems: describe _____							
16. Nose bleeds							
17. Runny nose							
18. Stuffy nose							
19. Sinus pain							
20. Sore gums							
21. Excessive salivation							
22. Hoarseness							
23. Sore or scratchy throat							
24. Difficulty swallowing							
25. Cough							
26. Spitting blood							
27. Difficult breathing: describe _____							
28. Excessive sputum							
29. Wheezing							
30. Tightness or pain in chest							
31. Heart pounding							
32. Joint swelling or pain							
33. Increased appetite							
34. Loss of appetite							

Symptoms	Yes	Uncer- tain	Once	Occa- sionally	Fre- quently	Continu- ously	Currently
15. Diarrhea							
16. Jaundice (yellowing of skin or eyes)							
17. Nausea							
18. Vomiting							
19. Stomach pain or cramps							
20. Infection of kidney, bladder or prostate							
21. Pain in urination							
22. Frequent urination							
23. Decreased urination							
24. Dark colored urine							
25. Convulsions							
26. Poor coordination							
27. Dizziness or fainting							
28. Tingling extremities							
29. Muscular twitching							
30. Difficulty in smelling							
31. Difficulty in tasting							
32. Flushing of skin							
33. Itching or burning of skin							
34. Yellowing or degenera- tion of fingernails							
35. Skin rash or disease							
36. Depression							
37. Insomnia							
38. Excessive irritability or nervousness							
39. Memory loss							
40. Over active mental state							

8. Smoking History

- a. Ever smoked regularly? (If no, skip rest of questions.) yes___ no___
- b. Smoke regularly now? (If no, skip questions "c" and "d".) yes___ no___
- c. How much and how long?
- | | | | |
|--------------|-------------------|---------------|--------------|
| | <u>Cigarettes</u> | <u>Cigars</u> | <u>Pipes</u> |
| No. per Day | _____ | _____ | _____ |
| No. of Years | _____ | _____ | _____ |
- d. Do you inhale? yes___ no___
- e. If not smoking, have you ever smoked in the past? yes___ no___
- f. How much and how long did you smoke before stopping?
- | | | | |
|--------------|-------------------|---------------|--------------|
| | <u>Cigarettes</u> | <u>Cigars</u> | <u>Pipes</u> |
| No. per Day | _____ | _____ | _____ |
| No. of Years | _____ | _____ | _____ |
- g. How many years since you stopped smoking?
- | | | | |
|--------------|-------------------|---------------|--------------|
| | <u>Cigarettes</u> | <u>Cigars</u> | <u>Pipes</u> |
| No. of Years | _____ | _____ | _____ |
- h. Did you inhale when you smoked? yes___ no___

9. Drinking History

a. Hard liquor

_____ Average number of ounces per sitting
(assume one ounce per drink)
_____ Average number of sittings per month
(assume 30 day month)

b. Wine

_____ Average number of ounces per sitting
(assume three ounces per wine glass)
_____ Average number of sittings per month

c. Beer

_____ Average total number of cans, bottles
or glasses per sitting
_____ Average number of sittings per month

d. Coffee and/or tea

_____ Average total number of cups per day

10. Years of schooling: _____ years

11. Have you ever been sick due to pesticides? yes___ no___ unknown___

If yes, complete and attach Page 3 of PHS Form Number 1-165-2.

7/30/75

Case ID: 220300429

CUSA-00318546

COMMUNITY STUDIES ON PESTICIDES AND MML/SOLANO LABORATORIES

INSTRUCTIONS TO LABORATORY RE COLLECTION OF SPECIMENS.

INFORMATION:

DATE: _____

PATIENT'S NAME: _____ CASE NO. _____

EXACT TIME OF:

- a. Arrival at laboratory _____
- b. Last voiding prior to arrival _____
- c. Pt. voiding at laboratory _____

Time interval (Item c minus item b above) _____ hrs. _____ min.

EXACT VOLUME VOIDED (at Laboratory) _____ ml

INSTRUCTIONS:

1. BLOOD Use vacutainer technique, switching tubes as needed.

1. Draw 10 ml into each of 2 red top tubes. These will clot as they contain no anti-coagulant.
2. Draw 6 ml blood into grey top tube containing oxalate-fluoride for preservation of glucose. Mix well. Do not centrifuge.

3. URINE

1. Collect random specimen.
2. Fill in all information above.
3. Record total volume.
4. Fill 10 ml urine vial (in kit) and 120 ml urine bottle. Mark with patient's name.

PREPARATION

1. Centrifuge within 1 hour both red top tubes.
2. Transfer all clear serum possible to blue plastic screw cap vial. Discard centrifuged tubes (containing clots).
3. Repack urine 10 ml vial, serum vial and grey top tube into foam container.
4. Be sure all tubes are identified with patient's name.

5. Fill in name of patient on multi-copy referral form and after glucose write number of hours since patient's last meal.
6. Fold this sheet along with pre-stamped referral form and place in foam container along with tubes.
7. Put rubber band around container.
8. Place container in mailing envelope and mail.
9. Put 120 ml urine vial in mailing container. (Be sure patient's name is on bottle), and mail.

If any questions arise, call Berkeley collect

State Department of Health
(415) 843-7900 - Ext. 535 (Mr. Mengle or Dr. Serat)

MML/Solano Laboratories
(415) 549-1623 (Mr. Tuggey)

Name :

AMAID #: 11111111

DATE
REQUESTED

DR. Lohne

7.A. and left lateral of chest

Do not interpret

forward films to Dr. Lohne

M.D.

NUMBER FILMS, EXAMINATION

TECHNICIAN

VALLEY MEDICAL CENTER
of Fresno

RADIOLOGY REPORT

Case ID: 220300429

CUSA-00318549

829 5130	0981	08/18	08/19	08/20/75
----------	------	-------	-------	----------

TEST NO	TEST DESCRIPTION	RESULTS	UNITS	NORMAL ADULT VALUES
-54-				
350	URINALYSIS			T16
	APPEARANCE: STRAW, CLEAR	SPEC. GRAY, 1.1	027	
	CHEM. EXAM: PROTEIN.....NEG	GLUCOSE.....4+		KETONE.....1+
		HEMOGLOBIN.....NEG		
	CELLS: WBC/HPP: NONE, SEEN	RBC/HPP: NONE SEEN		
	CRYSTALS: AMORPHOUS.....1+			
	CASTS/LPF: NO CASTS SEEN			
833	PROTEIN, URINE	7	MG%	T09
600	GLUCOSE	281	*H MG/DL	T42
603	UREA NITROGEN	6.7	MG/DL	T11
604	URIC ACID	2.3	*L MG/DL	T11
605	CHOLESTEROL	164	MG/DL	SEE REVERSE
707	CALCIUM	8.9	MG/DL	T00
608	TOTAL BILIRUBIN	2.2	*H MG/DL	T11
612	ALK. PHOSPHATASE	194	*H I.U.	T11
613	TOTAL PROTEIN	7.7	GM/DL	T11
614	ALBUMIN	3.57	GM/DL	T11
	GLOBULIN	4.2	*H GM/DL	T11
	A/G RATIO	0.8	*L	T11
615	PHOSPHORUS	3.7	MG/DL	T11

PG. 1 (CONT) ATTN. OR OR DEPT.
HAROLD M. MALKIN, M.D.
Director

COMM. PESTICIDES STUDY
ST. DEPT. OF PUBLIC HLTH
BERKELEY, CA. 94704
C

MML/Solano Laboratories

Clinical Laboratory Affiliates
2920 TELEGRAPH AVE. BERKELEY, CA. 94705
(415) 549-1623

TIME: 1813

DATE COLLECTED: 08/18/75

PATIENT NAME	AGE	CLIENT NO	SPEC. NO	DATE COLLECTED	DATE REC'D	DATE REPORTED
829 5130		0981	08/18	08/19	08/20/75	

TEST NO	TEST DESCRIPTION	RESULTS	UNITS	NORMAL ADULT VALUES
620	SGOT	76	*H UY. UNITS	T11
621	LDH	183	MU/ML	T11

PG. 2 (END)* ATTN. OR OR DEPT.
HAROLD M. MALKIN, M.D.
Director

COMM. PESTICIDES STUDY
ST. DEPT. OF PUBLIC HLTH
BERKELEY, CA. 94704

MML/Solano Laboratories

Clinical Laboratory Affiliates
2920 TELEGRAPH AVE. BERKELEY, CA. 94705
(415) 549-1623

Case ID: 220300429

CUSA-00318550

Case #

179 cm		WT: 87 kg	BSA: 2.06 m ²	AGE: 30	SEX: Male	DATE: Aug. 25, 1975
--------	--	-----------	--------------------------	---------	-----------	---------------------

VENTILATION	RESULT	NORMAL
Minute Volume - Resting	8.8 l/min	7.4 l/min
Respiratory Rate (R.R.)	20/min	12-14/min
Tidal Volume (T.V.)	440 cc	570 cc
Dead Space (V _D) - Anatomic		
Dead Space (V _D) - Physiologic		
Alveolar Ventilation (V _A)		
Oxygen Consumption (V _{O2})		
V / 100 ML V _{O2}		
Minute Volume - Exercise		
Minute Volume - 100% O ₂		

MECHANICS OF BREATHING	BEFORE ISUPREL	NORMAL	% NORMAL	AFTER ISUPREL
Airway Resistance	5.3 L	4.4 L	120%	}
Vital Capacity	4.0 L	3.2 L	125%	
1 Second Forced Expiratory Volume (F.E.V. ₁)	75%	72%	-	
F.E.V. ₁ /E.V.C. (F.E.V. ₁ %)	96%	94%	-	
F.E.V. ₃ /E.V.C. (F.E.V. ₃ %)				
Maximum Expiratory Flow Rate (M.E.F.R.)	7.7 l/sec	9.0 ± 2.1 l/sec	86%	
Mean Midexpiratory Flow Rate (M.M.F.)	3.3 l/sec	4.6 ± 1.3 l/sec	72%	
T.L.C./M.M.F.				
Mean Midinspiratory Flow Rate/M.M.F.				
Maximum Voluntary Ventilation (M.V.V.)				
Maximum Expiratory Pressure				
Compliance				

DISTRIBUTION	RESULT	NORMAL
Helium Equilibrium Time		
Alveolar Nitrogen After 100% O ₂		
Wasted Ventilation - V _D (ANAT)-V _D (PHYS) RR		
Shunting - PO ₂ A After 100% O ₂		

DIFFUSION	RESULT	NORMAL
Single Breath CO Diffusing Capacity (Dcosb) ml/min/mm Hg CO	27.5	32.4

KEY MEDICAL CENTER

PULMONARY FUNCTION DATA

Case ID: 220300429

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LUNG VOLUMES	RESULT	NORMAL	% NORMAL
Functional Residual Volume (F.R.V.)	2.6 L	2.6 L	100%
Expiratory Reserve (E.R.)	1.2 L	1.5 L	80%
Residual Volume (R.V.)	1.4 L	1.1 L	127%
Expired Vital Capacity (E.V.C.)	5.3 L	4.4 L	120%
Total Lung Capacity (T.L.C.)	6.7 L	5.5 L	122%
Ratio Residual Volume (R.V.)	-	-	-
Total Lung Capacity (T.L.C.)	21%	20%	-

ARTERIAL BLOOD STUDIES	RESULT	NORMAL	METHOD
Resting Oxygen Saturation			
Exercise Oxygen Saturation			
Oxygen Saturation After 30% O ₂			
Oxygen Saturation After 100% O ₂			
pO ₂ -Rest			
pO ₂ -30% O ₂			
pO ₂ -100% O ₂			
pCO ₂ -Rest			
pH-Rest			

Miscellaneous:

Interpretation:

Date:

M. D.

VALLEY MEDICAL CENTER
of Fresno
PULMONARY FUNCTION DATA

Case ID: 220300429

CUSA-00318552

DEPARTMENT OF HEALTH

WAY

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October 1, 1975

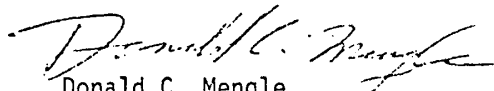
Re: Mr. _____

Dear Dr.

At the request of your patient referred to above, I am enclosing a copy of the record of his physical and neurological examination received during 1975 as a participant in our study of the health of persons exposed to pesticides. Copies of completed questionnaires on past medical history and occupational history are also available upon request. We are supplying this information in accord with the participant's response to a routine question on our Voluntary Participation Consent Form regarding his wish for us to supply a report of our findings to his personal physician.

We anticipate conducting these examinations on an annual basis and will continue to make the results available to you when requested by the participant. If you have any questions, please contact myself or Dr. Ephraim Kahn, Project Director. Our phone number is (415) 843-7900.

Sincerely yours,


Donald C. Mengle
Research Specialist III
Community Studies on Pesticides

CM:ra

Case ID: 220800429

CUSA-00318553