REPORT

A Health Survey of Residents of the Relocated Bayway Neighborhood, Elizabeth, New Jersey

Conducted by

Occupational and Environmental Health Service
New Jersey State Department of Health

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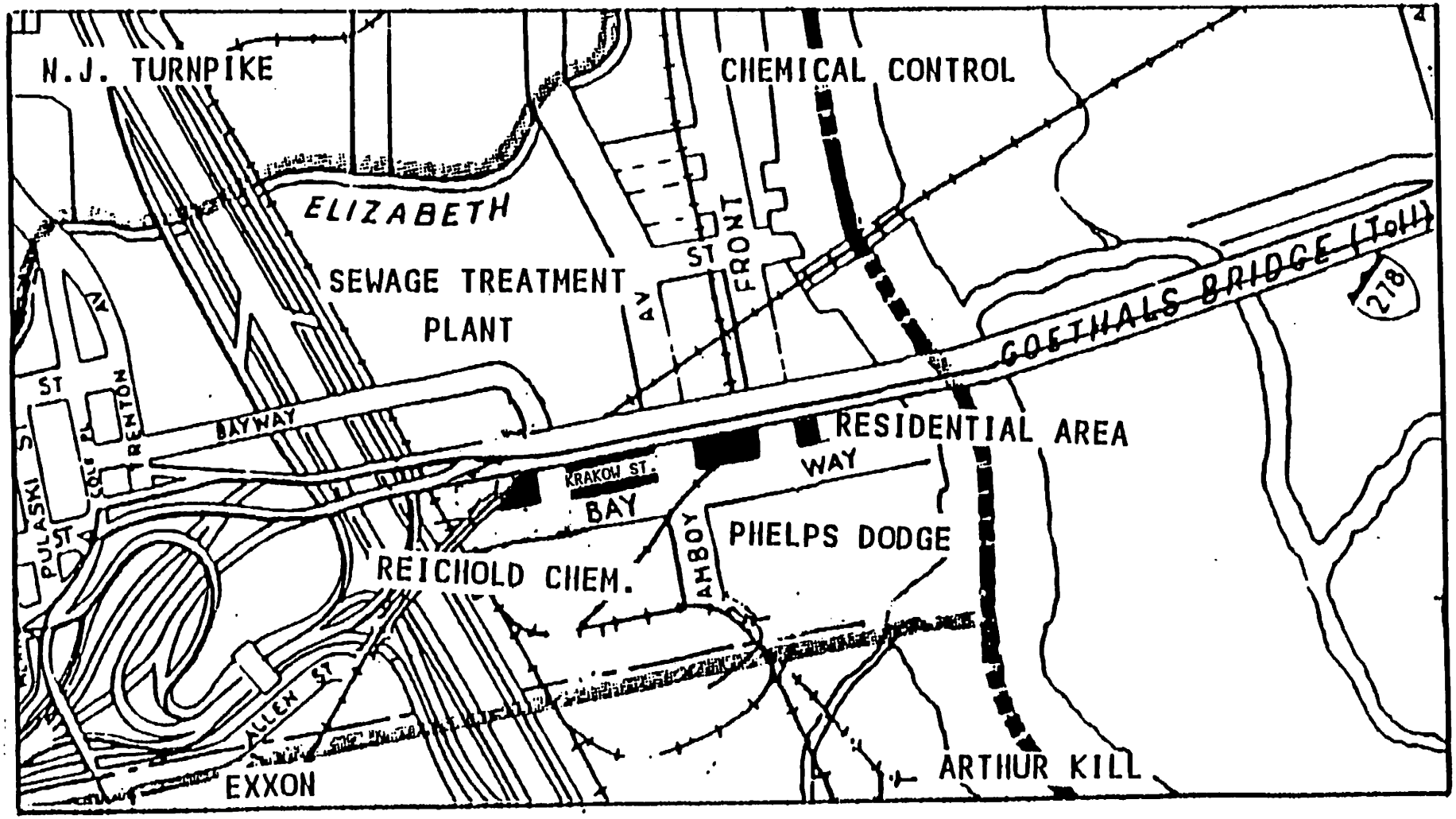
I. INTRODUCTION

A. History of Relocated Bayway

Relocated Bayway is a neighborhood of 17 homes located in the industrialized Bayway section of Elizabeth, New Jersey, between Exit 13 of the New Jersey Turnpike and the Arthur Kill. It has been physically isolated from the rest of Elizabeth and reduced in size by highway and industrial development.

A 1922 zoning ordinance in the City of Elizabeth encouraged the building of heavy industry in the Bayway section. In 1928 the Goethals Bridge was completed, connecting Elizabeth with Staten Island; it now carries Interstate 278. In 1952, the New Jersey Turnpike was built through the neighborhood, cutting off some of the homes from the remainder of Bayway; Bayway Avenue was "relocated" to a nearby bridge over the Turnpike, and the neighbohood acquired its name. At present, the neighborhood is bounded by a freight rail line and the Turnpike and its Exit 13 complex to the west; Reichhold Chemical Corporation and Phelps Dodge Copper Products along its southern edge (both are within 100 yards of most of the homes); the bridge, a regional sewage treatment plant, and other heavy industry on its northern edge; and the Arthur Kill and some small industries to the east. Immediately behind Reichhold Chemical and the Turnpike is Exxon's Bayway Refinery; the 1980 Chemical Control Company explosion and fire occured one-half mile to the northeast. (map, next page)

RELOCATED BAYWAY
DETAIL



B. Early Involvement of N.J. Department of Health and Other Agencies

The area around Relocated Bayway is familiar to Turnpike travelers, who know the segment between Exits 12 and 15 for its pollution and odors. Over the years, Relocated Bayway residents have complained about odors and irritation from chemicals emitted by neighboring plants. In 1969, emissions from Phelps Dodge Copper Products allegedly turned its own copper stock black. Following resident complaints, the City of Elizabeth met with the State Bureau of Air Pollution and with plant managers to attempt to reduce emissions. In 1975, chemicals released from Reichhold Chemical caused chemical irritation and corroded paint on automobiles, for which Reichhold paid for repainting. Odors and complaints continued throughout the 1970's, with residents making claims in the media that disease was related to living in Relocated Bayway.

The plume of smoke and chemicals from the Chemical Control Company fire on April 21, 1980, passed through Relocated Bayway. Airborne organic chemicals measured by various agencies were reported at less than 200 parts per billion of total organics. However the smoke was very irritating, and residents went to a citizen's group, the Coalition for a United Elizabeth (C.U.E.), with health complaints. C.U.E. approached Dr. Michael Gochfeld, then director of the New Jersey State Department of Health (DOH),

Occupational and Environmental Health Services, to request a survey of the community. On May 19, 1980, Dr. Gochfeld and DOH Public Health Nurse Consultant Linda Glazner performed a house-to-house survey, using a standarized questionnaire. Residents mostly had skin and gastrointestinal complaints which were mild in degree.

Following this, in December, 1980, C.U.E. enlisted the help of Elizabeth Schneider, lawyer, of Rutgers Law School's Constitutional Litigation Clinic. Ms. Schneider requested that DOH perform health studies on residents of Relocated Bayway and nearby Elizabethport who were exposed to the smoke from the Chemical Control Fire. DOH did not then have the funding or personnel to perform such studies.

Citizen anger peaked in June, 1981, when a plant accident at Reichhold Chemical released an unknown amount of phthalic anhydride, an organic acid that is an irritant and sensitizer, over the community. When health officials apparently did not respond, residents marched upon the gates of Reichhold several days later, and were removed by police. During a similar, repeated incident in August, 1981, the City Health Department issued a summons for nuisance against Reichhold Chemical. At the trial, Dr. Gochfeld, now at Rutgers Medical School, testified

that symptoms of burning eyes, skin, throat, and respiratory symptoms, such as cough, were repeatedly being reported by residents, and were "exactly the symptoms that are caused by chemical irritants such as phthalic anhydride, maleic anhydride, and others on the list..." of Reichhold reactants and products. Other complaints to the City Health Department were filed by residents on October 20 and 26, 1981. In November, 1981, a municipal court judge fined Reichhold $500 for the August incident.

C. Creation of DOH Study

By mid-1982, under the direction of Dr. Kenneth Rosenman, DOH Occupational and Environmental Health Services had expanded its capabilities and could then perform community studies. During the summer of 1982, Ms. Schneider requested Dr. Rosenman to study the community. On September 20, 1982, Ms. Schneider, Dr. Gochfeld, and representatives of C.U.E. met with Dr. Rosenman and other DOH scientists. The history of Relocated Bayway was reviewed, and the study was begun.

With the assistance of the Elizabeth City Health Department and C.U.E., the medical examinations were set up at nearby Drotar Field Recreation Center, and lists were obtained of current and past residents. On November 10, 1982, the upcoming examinations were discussed with the Relocated Bayway residents in a public meeting at a local tavern.

The content of interviews and testing were chosen on the basis of residents' potential toxic exposures. Because of Relocated Bayway's unusual proximity to Reichhold Chemical, to other chemical facilities, to the intersection of interstate highways, and to a refinery, specific medical testing was indicated. Tests were offered to measure lung injury with spirometry (pulmonary function testing), benzene exposure with complete blood counts (CBCs) and urinary phenol testing (phenol is a metabolite of benzene), lead exposure (from auto exhaust) with blood leads and erythrocyte protoporphyrins, chronic volatile organic chemical exposure with multiphasic chemical screens that included tests for liver and kidney function, and allergy to phthalic anhydride with serum testing for phthalic anhydride antibodies.

Of the approximately 60 current and 50 former residents who could be located, 71 individuals were examined on November 17. These included 47 current and 24 former residents. The survey included multi-phase interviews administered by DOH physicians, spirometry, and the laboratory testing. Personnel from the Department of Environmental and Community Medicine, Rutgers Medical School, and independent contractors, assisted with testing.

II. MATERIALS AND METHODS

A. Study Population

The study was designed to include all present and past residents who could be located and were capable of being examined. Lists of current and past residents were obtained from C.U.E. Although the population of the community has been relatively stable and most residents knew each other, several families and individuals were of uncertain or part-time residency status, could not be traced, or recently had moved. Past residents from the time period 1971-1982 were invited. The number of current residents was estimated at 60, and past residents at 50. A total of 71 individuals were examined; these included 47 current and 24 former residents.

B. Medical Examinations

Appendix A shows the consent form and standardized examination forms. All examinees underwent occupational, smoking and alcohol, medical diagnosis, medication, and symptomatology histories. Heads of households were asked for residential histories and demographic data; adult women underwent reproductive histories. All interviews were performed by DOH personnel. Examinees all underwent physical examinations by physicians from DOH or Rutgers Medical School, Department of Environmental and Community Medicine. Spirometry (pulmonary

function testing) and laboratory tests were performed by DOH and Rutgers personnel, and contractors, using standardized procedures, on all subjects over age 5. Laboratory tests included blood lead and erythrocyte protoporphyrin, complete blood count (CBC) and multiphasic chemical screening panel (chem screens) on all subjects over age 13, and urinary phenol testing on those over age 5. Blood lead analysis was performed by the State Health Laboratory; other chemical tests were sent to Metpath Laboratories, Teterboro, N.J. Also, blood specimens were sent to the University of Cincinnati for measurement of antibodies to phthalic anhydride, a strong irritant and allergen produced by Reichhold Chemical.

Rates were calculated for positive responses on interview, for abnormal findings on physical examination, and for abnormalities on testing. Since there were differences in the age distribution between current and former residents, the rates were age-standardized (Appendix B).

C. Environmental Assessment

Health effects often are non-specific and may be related to factors other than toxic chemicals. Also, toxic exposures may not produce disease for many years, and in numbers too small to be noticed in a small group of residents. For these reasons, DOH sought data on residents' exposures.

Considerable past data was available from the State Department of Environmental Protection and from the New Jersey Institute of Technology on chemical emissions from nearby industrial facilities, and on air testing done at the Exit 13 toll plaza of the Turnpike and elsewhere. These sets of data included estimates or measurements of many entities, including volatile organic chemicals and polynuclear aromatic hydrocarbons. The measurements were taken using mutiple 24-hour air samples over many days' time.

D. Comparison to Belleville, New Jersey

All Relocated Bayway examinees were compared to the population of Belleville, New Jersey, upon which DOH performed similar, extensive medical examinations in June, 1983. The comparison was made because Belleville residents were primarily blue collar, of socioeconomic and demographic status similar to Relocated Bayway, and therefore were a reasonable control group. Belleville residents had had numerous health complaints during an episode of odors caused by a local chemical company, but air monitoring had shown no appreciable chemical exposure. The complaints were mostly mucosal, skin, and respiratory irritant complaints. The two populations were statistically compared according to the following parameters: diagnoses, symptoms, physical examinations, blood tests, spirometry, and urinary phenol tests.

III. RESULTS

A. Health-Effects Data

Demographic, residential, and smoking and alcohol histories revealed no clear trends, nor differences between current and former residents. Eleven residents had worked in the surrounding plants, 9 at Phelps Dodge and 2 at Reichold Chemical.

1. Reported Physician Diagnoses

The interviewer-administered questionnaire data on physician-diagnosed conditions are presented in Table 1. Subjects were asked whether they had ever been told by a doctor that they had a diagnosis, as read from the Medical History section of the questionnaire (Appendix A, pages F-1 to F-4).

When current and former residents were compared, current residents had a higher frequency of a number of recalled diagnoses. The differences between current and former residents for asthma and for pneumonia/pleurisy/bronchiectasis were statistically significant. (Table 1 and Appendix B). (There were no cases of bronchiectasis, so the latter category included only pneumonias and pleurisy). Several other respiratory diagnosis also were more frequent among current residents at less than statistical significance. Diagnoses more frequent in current residents included other lung diseases, psoriasis/hives, ear

hypertension, ulcer, and other gastrointestinal and musculoskeletal conditions (Table 1, summary).

Reproductive histories revealed no notable reports of excess miscarriages or other problems, nor differences between the two groups.

2. Symptoms

The interviewer-administered questionnaire data on symptoms are on Table 2. Subjects were asked if they had had a given symptom (complaint) during the twelve months prior to the survey (Appendix A, pages I-1 to I-2); positive responses were those who had the symptoms at least once a week. Symptom categories on Table 2 include several symptoms.

When current and former residents were compared, current residents had a higher frequency of a number of symptoms. The differences between current and former residents for eye burning/injury/double vision/loss of sight, and for dry itchy skin, were statistically significant. In the data analysis, symptoms of eye injury, burning, double vision, and loss of sight were combined; of these, eye burning comprised the bulk of positive responses among current residents. For current residents, other eye, skin, and respiratory symptoms also were more frequent, at less than statistical significance. Age-adjustment did not appreciably change the results. The

degree of severity of the symptoms was mild-to-moderate.

The following symptoms were reported by more than half of the subjects: eye injury/burning/double vision, bones and joints complaints, runny nose/nasal stuffiness, daily morning cough/phlegm, stomach pains/cramps, dry/itchy skin, and sore throat.

3. Physical Examinations

The presence of several selected physical findings in each category of examination is listed in Table 3. Current residents had a higher rate of abnormalities than did former residents on examination of the nasal mucosa (mostly noted as inflamed or swollen nasal passages), and on chest ausculation (stethoscope examination, primarily diffuse wheezing). Current residents also had an unexplained increase in the rate of abnormal deep tendon reflexes (either hyper-or hypoactive). None of the differences were statistically significant.

4. Laboratory Testing

Results of certain tests that may be associated with environmental disease are summarized in Table 4. Several individuals had an unexplained elevated serum GGTP, a liver function enzyme. Otherwise, there were no notable trends nor differences between current and former residents, for those tests

known to be affected by chemical exposure: white blood cell count, hematocrit, eosinophils, SGOT, SGTP, and urinary phenol. Among tests not known to be affected by chemical exposure (the other tests on CBCs and chem screens), there were likewise no trends nor differences. Antibodies to phthalic anhydride were not detected at significant levels in anyone.

Spirometry data are summarized in Table 5. Results were reported as percentage of predicted value (for height and age) for each of the three most meaningful parameters: FVC (forced vital capacity), FEV1/FVC (percentage of the forced expiratory volume expired in the first second also termed FEV 1%), and FEF 25-75 (mean forced expiratory flow over the middle half of the FVC). The expected normal values to which these were compared were derived from a standard population (5) and are automatically age-and-sex adjusted. On spirometry, current residents had a greater rate of abnormal results than did former residents for all parameters, however, the differences between groups were not statistically significant. The four former residents with abnormal FEF 25-75 had all left Bayway within five years. No abnormalities in FEF 25-75 were found among former residents who had moved out more than 5 years previously.

B. Comparison to Belleville, New Jersey

When compared to the residents of Belleville, New Jersey residents of Relocated Bayway were similar in most ways.

However, among symptoms occurring at least once during the year preceding each study and grouped by organ system (Table 6A), Relocated Bayway residents had increased rates of respiratory tract and urinary tract symptoms. Both differences were statistically significant, after adjustment for age and sex. The respiratory symptoms were no longer significant after controlling for smoking.

Relocated Bayway residents also had higher rates than did Belleville residents of physician-diagnosed asthma, emphysema pneumonia/pleurisy, work-related lung conditions, eczema and hypertension. Only work-related lung conditions were significantly greater after controlling for cigarette smoking. On physical examinations abnormalities of the nasal mucosa (mostly of nasal inflammation, as previously noted), chest auscultation (mostly wheezing, again as previously noted) and deep tendon reflexes were statistically increased among Bayway residents. The two respiratory findings on physical examination were reanalysed controlling for cigarette consumption. Both differences remained statistically significant. There were no major differences in the populations among blood tests, except again for the unexplained abnormal GGTP results in several Relocated Bayway residents. With lung function tests, Relocated bayway residents had consistently higher rates of abnormal results (Table 6B), although the degree of reduction in lung function values was mild. The difference in FEF 25-75 between Belleville and Relocated Bayway smokers was statistically

significant. This indicates small airways disease, among those with the most exposure (that is, exposure both to cigarette smoke, and the Relocated Bayway environment).

The populations were comparable in age, sex, and racial distributions.

C. Past Environmental Data

Two sets of data were available to directly assess the toxic exposures of Relocated Bayway residents:

1) a 1982 inventory, by the State Department of Environmental Protection (DEP), of estimated production, use, and emission of potentially toxic volatile organic chemicals by industries located around Relocated Bayway;
2) a 1980 DEP report, performed by the New Jersey Institute of Technology(NJIT), "Analysis of Selected Toxic and Carcinogenic Substances in Ambient Air in New Jersey"(2), which included sampling done at the Turnpike's Exit 13 Toll Plaza, at the edge of Relocated Bayway.

The industrial emissions data were compiled by DEP primarily in 1978 and 1979, and were considered to be accurate through 1980. Importantly, use of benzene at Reichhold Chemical

was curtailed by mid-1982, before the medical examinations, so exposure to benzene was greatly reduced after then. Data for facilities nearest Relocated Bayway are shown on Table 7.

The data indicate that there were considerable emissions of benzene, toluene, chlorinated hydrocarbon solvents, anhydrides, and formaldehyde. Most relevant to residents are emissions from Reichhold and Phelps Dodge, since both are so close to homes.

Multiple 24-hour air samples done by NJIT staff in 1979 are summarized in Table 8, which is taken directly from the DEP/NJIT report. Average concentration of volatile organics was 20 to 25 parts per billion (ppb) with a potential range from 0 to over 250 ppb, the highest among four urban sites in that study, and well above rural levels. Average benzene concentration was 7.2 ppb. Among particulates, lead exceeded 1 milligram (1000 nanograms) on the average; the average at Newark Airport was slightly higher, about 1300 nanograms. Levels of polynuclear aromatic hydrocarbons were described as "similar in all four areas" by NJIT; Elizabeth was the lowest, presumably because of distance from oil and coal burning sources (home and industrial heat).

IV. DISCUSSION

A. General

Both the health effects data from this study and the past environmental exposure data are meaningful to the health of the residents of Relocated Bayway. The health of both current and former residents is relevant, because both groups were at one time exposed to the local environment. However, current residents would reveal health effects caused by the current environment and, when analyzed, they had more prolonged exposures.

Two potential criticisms of this study are that the number of Relocated Bayway residents was small, and that since only 71 of approximately 110 current and former Relocated Bayway residents (65%) were examined, the population is self-selected. Both factors require that the data be interpreted cautiously. When numbers are small, statistical power is low, and findings may be missed, or a few abnormalities can produce a result where none should exist. When a population is self-selected, it is possible that only ill subjects responded.

However, the findings in this study appear to be valid for a number of reasons.

First, Belleville and Relocated Bayway, which are compared here, have response rates of 60% and 65%, respectively, and thus should be comparable. Secondly, the response rate among current residents was 47 of 60, a relatively high 78%, giving a fairly complete picture of them. The low response rate about 50% among former residents (24 of approximately 50) is more subject to self-selection bias than among current residents. So, the former residents were more likely to be represented by subjects who were ill, yet current residents generally had greater rates of symptoms and abnormal findings. Finally, and perhaps most important, DOH found consistent mucosal and respiratory effects among current residents in every aspect of this study (diagnoses, symptoms, physical examinations, and spirometry). This consistency confirms findings that were found at statistically significantly greater rates in current residents, and lends strength to findings that were not statistically strong.

B. Health Effects

The most commonly reported physician-diagnosed conditions (Table 1) in Relocated Bayway are conditions reported in other communities surveyed by DOH, including Belleville. DOH tends to study such communities because of complaints of chemical exposures or odor complaints, as in Belleville and Relocated Bayway. Since there are no reliable rates of diagnoses published for the general population, it is difficult to decide whether there is an overall increase in diagnosed disease, or whether

residents' are more likely to remember and/or report these conditions. However, the statistically significant increase among current residents in rates of diagnosed asthma and pneumonias/pleurisy/bronchiectasis, and the trend towards other skin and respiratory diagnoses, is scientifically plausible because of the environment in Relocated Bayway.

The substantial number of symptoms of skin, mucosal, and respiratory symptoms reported in this study (Table 2) confirms the complaints residents have previously made to the media. These complaints are those expected with ongoing exposure to irritant chemicals. Because the number of residents examined was small and the statistical power of the study was low, the absence of statistically significant differences is not necessarily decisive. The trends in the data which suggest ongoing chemical irritation of current residents, need to be considered. Those tests which were statistically significant strengthen those trends. The rate of respiratory tract symptoms was significantly greater than that found in Belleville, although not statistically greater when cigarette smoking was controlled for. Finally, the differences do not appear to be explained by recall bias (increased health concerns among current residents) for all the groups studied (current and former Bayway residents, and Belleville residents) were very concerned about exposures.

DOH usually does not find abnormal physical findings or test results among residents living near landfills or other toxic sites, despite the large number of health complaints we receive from these communities. Therefore, the higher rates of abnormalities of the nasal mucosa, on chest auscultation, (Table 3) and on spirometry (Table 5) further indicates a health concern for current Relocated Bayway residents. Again, since the rates of abnormalities are higher than in Belleville, we interpret the health effects are beyond those found with typical urban air pollution. The findings could conceivably be caused by chemical allergy, or that some of the examining physicians were different in the two studies. However, testing did not reveal allergy, and the presence of different physicians does not explain the difference in symptoms or test results.

The most important objective findings in this study are that Relocated Bayway residents have a consistently higher rate of pulmonary function abnormalities than Belleville residents (Table 6B). The difference is statistically significant for the most heavily exposed group (current smokers) in the most sensitive parameter (FEF 25-75). After controlling for other factors such as smoking and occupation we believe the environment in Relocated Bayway is the most likely cause for these lung findings.

There is no clear environmental cause for the increased rates of abnormal deep tendon reflexes, elevated GGTP, or increased urinary tract symptoms.

C. Environmental Exposure

DEP emissions data from 1980 indicate that numerous chemicals are annually produced in significant quantities near Relocated Bayway, mostly within 100 yards of most of the homes. Any of the listed chemicals could cause the health effects found in this study, although the anhydrides are the most irritating; probably the combination of all emitted chemicals plus the urban air pollution of the area is a better explanation.

Emissions data are more revealing than the air monitoring data in this study. Emissions data will document potential exposures, while health effects may not appear until exposures are high or after many years, and air monitoring data may miss peaks of exposure or local atmospheric differences. Since the NJIT air study's sampling was done at the Exit 13 Toll Plaza, 300 yards upwind from most homes, it is best regarded as an indicator of the background or baseline air of Relocated Bayway.

Emissions are generally periodic, occuring either with the timing of an industrial process, or they are sporadic. At the time Reichhold Chemicals used benzene in manufacturing, air benzene levels may have been very high at the time of emissions. In a 1978 E.P.A. document, "Assessment of Human Exposures to Atmospheric Benzene" (6), E.P.A. estimated annual average benzene concentrations at the Reichhold plant boundary (50 to 200 feet from homes in Relocated Bayway) at 28 ppb (Table 7, page 40),

with peak concentrations of 4,000 to 12,000 ppb at the plant boundary. However, air measurements were not done in homes, and the maleic anhydride process was curtailed by mid-1982.

The E.P.A. data are valuable in assessing exposures to existing chemicals in Relocated Bayway, even though benzene may not have been a factor by the time of the DOH study. Levels measured by NJIT were well below occupational (workplace) standards, when such standards exist, and are not known to specifically cause disease. However, high levels of urban air pollution have been associated with increased rates of respiratory disease (1,3,4), and because of proximity to sources Relocated Bayway has a particularly heavy pollution load. In the NJIT study, pollutant levels were 10 to over 100 times higher there, compared to rural areas of New Jersey, and such levels may still be nearly that high.

D. Conclusions

DOH concludes that current residents of Relocated Bayway were experiencing irritation of their skin, mucous membranes, and respiratory tracts at the time of the examinations. The adverse health effects were present at rates greater than among residents of Belleville. DOH does not believe these results are explained by recall bias, or by minor differences in methodology between this study and the Belleville study, to which this is compared.

DOH concludes that the adverse health effects found are related to chemical exposures in the Relocated Bayway area. DOH found significantly greater rates in current residents of self-reported lung diseases and of eye and skin symptoms, compared to former residents, and significantly greater rates of small airways disease (decreased FEF 25-75) in smokers in Bayway compared to smokers in Belleville. Additionally, mucosal and respiratory effects were consistently higher among Bayway residents as measured by past diagnoses, symptoms, physical examinations, and spirometry although statistical significance was not achieved for these latter tests. Because of low statistical power (10-30%) of this study, we believe the consistent trend in the results cannot be ignored. Based on this study, DOH is concerned about the potential future impact of continued exposure of residents to the Relocated Bayway environment, particulary upon their respiratory tracts.

We recommend the following:

1) The Department of Environmental Protection review emissions and chemical usage from industries surrounding Relocated Bayway and conduct air sampling in this area to evaluate current resident's exposures.

2) That an interagency task force of the Departments of Environmental Protection and Health be set up to review the data collected above. After reviewing the new data collected this

task force should make recommendations on what further action should be implemented. Actions to be considered include; tighter emission controls and whether individuals should be allowed to continue to live in this area.

3) The interagency task force should also review how widespread a problem the exposure to chemical air pollutants might be in the state, and whether in other communities which are in close proximity to industrial facilities, remedial action is necessary.

Table 1

SUBJECTS' REPORTING OF PHYSICIAN - DIAGNOSED CONDITIONS: COMPARISION OF FREQUENCIES BETWEEN FORMER AND CURRENT BAYWAY RESIDENTS

Condition # on Questionnaire	Diagnosis	Residents Reporting Diagnoses			P value*
		Total (%) N = 71	Current (%) N = 47	Former (%) N = 24	Fisher's exact test
	Respiratory				
10	Asthma	6 (8.5%)	5 (10.6%)	1 (4.2%)	p=0.33***
11	Chronic Bronchitis	8 (11.3%)	5 (10.6%)	3 (12.5%)	p=0.55
12	Emphysema	3 (4.2%)	3 (6.4%)	0 (0.0%)	p=0.28
8,9,13	Pneumonia, pleurisy or bronchiectasis	12 (16.9%)	11 (23.4%)	1 (4.2%)	p=0.04**
15	Work-Related Lung Condition	4 (5.6%)	3 (6.4%)	1 (4.2%)	p=0.58
16,17	Other (+ TB)	7 (9.9%)	6 (12.8%)	1 (4.2%)	p=0.24
	Skin				
42,44	Psoriasis or Hives	6 (8.5%)	6 (12.8%)	0 (0.0%)	p=0.08
43	Eczema or other skin problems	22 (31.0%)	14 (29.8%)	8 (33.3%)	p=0.76
	Cancer				
83	Skin Cancer	2 (2.8%)	1 (2.1%)	1 (4.2%)	p=0.56
93	Leukemia	0 (0.0%)	0 (0.0%)	0 (0.0%)	--

Table 1 (cont'd)

Condition Number on Quesionnaire	Diagnosis	Residents Reporting Diagnosis: Total (%) N = 71	Current (%) N = 47	Former (%) N = 24	P value* Fisher's Exact test
84-92, and 94-98	All other Cancer	2 (2.8%)	1 (2.1%)	1 (4.2%)	p=0.57
	Head and Neck				
52-58	Eyes, all disorders	11 (15.5%)	8 (17.0%)	3 (12.5%)	p=0.45
59,61,63-65	Hay fever, sinus problems, allergies, nasal or laryngeal polyps	16 (22.5%)	11 (23.4%)	5 (20.8%)	p=0.81
62	Ear infections	10 (14.1%)	8 (17.0%)	2 (8.3%)	p=0.27
60,66,67	Other Ear/ Nose/and Throat Problems	14 (19.7%)	10 (21.3%)	4 (16.7%)	p=0.45
	Blood				
47	Low White Count	0 (0.0%)	0 (0.0%)	0 (0.0%)	--
46	Anemia	5 (7.0%)	3 (6.4%)	2 (8.3%)	p=0.55
48-51	Other Blood Conditions	1 (1.4%)	0 (0.0%)	1 (4.2%)	p=0.34
	Cardiovascular				
5	Hypertension	14 (19.7%)	11 (23.4%)	3 (12.5%)	p=0.22
2,3,6	Heart Attack Angina or Claudication	5 (7.0%)	4 (8.5%)	1 (4.2%)	p=0.45
1,4,7	Other Heart Conditions	10 (14.8%)	6 (12.8%)	4 (16.7%)	p=0.45

Table 1 (cont'd)

Condition Number on Questionnaire	Diagnosis	Residents Reporting Diagnosis: Total (%) n=71	Current (%) n=47	Former (%) n=24	P value* Fisher's exact test
	Gastrointestinal				
18-23	Ulcer	5 (7.0%)	5 (10.6%)	0 (0.0%)	p=0.12
26-33	Liver or Gallbladder Desease	7 (9.9%)	5 (10.6%)	2 (8.3%)	p=0.56
23-25,	Other G.I. conditions	19 (26.8%)	14 (29.8%)	5 (20.8%)	p=0.30
	Neurological				
71	"Nervous Disorder"	2 (2.8%)	1 (2.1%)	1 (4.2%)	p=0.57
72	Epilepsy, stroke, Parkinson's Disease, and other Neurologic Conditions	--	--	--	--
	Musculoskeletal				
73,74	Arthritis	8 (11.3%)	6 (12.8%)	2 (8.3%)	p=0.45
75-78	Other musculoskeletal conditions	13 (18.3%)	10 (21.3%)	3 (12.5%)	p=0.29

* Statistical significance of difference between current & former residents
** Statistically significant difference
*** After age adjustment, difference is statistically significant

Table 1, (cont'd)

Summary of Diagnoses Occuring More Frequently
In Current Residents
Than In Former Residents

Statistically significant

- Pnemonia/pleurisy/bronchiectasis
- Asthma (after age-adjustment)

Less than Statistical significance

- Other lung diseases
- Psoriasis/hives
- Ear infections
- Hypertension
- Ulcer
- Other gastrointestinal conditions
- Other musculoskeletal conditions

Table 2

SYMPTOMS -- SELF REPORTED

Condition # on Questionnaire	Symptom	Symptoms Reported: Total (%) N = 71	Current (%) N = 47	Former (%) N = 24	P of Chi-square*
1)a and c	eye pain or irritation	28 (39.4%)	20 (42.6%)	8 (33.3%)	p=0.45
1)b,d,e,f	eye injury, burning, double vision, loss of sight	44 (62.0%)	33 (70.2%)	11 (45.8%)	p=0.04**
2)a-f	any ear problem	33 (46.5%)	24 (51.1%)	9 (37.5%)	p=0.28
3)a	rash	20 (28.2%)	15 (31.9%)	5 (20.8%)	p=0.33f
3)b	dry, itchy skin	36 (50.7%)	28. (59.6%)	8 (33.3%)	p=0.04**
3)c,d,e	skin growth, tumor,acne	24 (33.8%)	15 (31.9%)	9 (37.5%)	p=0.64
4)a,b	stomach pain, cramps,	38 (53.5%)	25 (53.2%)	13 (54.2%)	p=0.94
4)c,d	diarrhea, constipation	17 (23.9%)	11 (23.4%)	6 (25.0%)	p=0.88
4)e,f,g,h	rectal pain, burning, change in bowel habits, other stomach/intestinal problems	22 (30.1%)	14 (29.8%)	8 (33.3%)	p=0.75
5)a	cough lasting more than one month	23 (32.4%)	17 (36.2%)	6 (25.0%)	p=0.34
5)b,c	daily morning cough/phlegm	41 (57.8%)	30 (63.8%)	11 (45.8%)	p=0.15

Table 2 (cont'd)

Condition Number on Questionnaire	Type of Condition	Symptoms Reported: Total (%) N = 71	Current (%) N = 47	Former (%) N = 24	P of Chi-square*
5)d	shortness of breath	29 (40.8%)	21 (44.7%)	8 (33.3%)	p=0.36
5)e	cough with blood	2 (2.8%)	1 (2.1%)	1 (4.2%)	p=0.62f
5)f	runny nose, nasal stuffiness	42 (59.2%)	25 (53.2%)	17 (70.8%)	p=0.15
5)g	sore throat	36 (50.7%)	22 (46.8%)	14 (58.3%)	p=0.35
5)h	wheeze	6 (8.5%)	5 (10.6%)	1 (4.2%)	p=0.33f
5)i	chest pain, pressure, tightness	26 (36.6%)	19 (36.2%)	7 (33.3%)	p=0.35
5)j	colds (>3/yr)	25 (35.2%)	17 (36.2%)	8 (33.3%)	p=0.81
5)k	other respiratory	13 (18.3%)	8 (17.0%)	5 (20.8%)	p=0.69f
6)a-f	heart and circulation	34 (47.9%)	24 (51.1%)	10 (41.7%)	p=0.45
7)a-e	bones and joints	43 (60.6%)	31 (66.0%)	12 (50.0%)	p=0.19
8)a-g	kidney and bladder	29 (40.8%)	17 (36.2%)	12 (50.0%)	p=0.26
9)a	tiredness and weakness	30 (42.3%)	20 (42.6%)	10 (41.7%)	p=0.94
9)b,c	muscle strengh loss,	15 (21.1%)	13 (27.7%)	2 (8.3%)	p=0.06f
9)d,l	numbness, loss of sensation, pins & needles	31 (43.7%)	23 (48.9%)	8 (33.3%)	p=0.21
9)e	tremor	8 (11.3%)	5 (10.6%)	3 (12.5%)	p=0.81f

Table 2 (cont'd)

Condition Number on Questionnaire	Type of Condition	Symptoms Reported: Total (%) N = 71	Current (%) N = 47	Former (%) N = 24	P of Chi-square*
9)f,g	difficulty walking or writing	19 (26.8%)	13 (27.7%)	6 (25.0%)	p=0.81
9)h,n	difficulty sleeping, depression	34 (47.9%)	22 (46.8%)	12 (50.0%)	p=0.80
9)i,m	dizziness, fainting, unconsciousness	26 (36.6%)	17 (36.2%)	9 (37.5%)	p=0.91
9)j	frequent nausea	13 (18.3%)	9 (19.2%)	4 (16.7%)	p=0.80
9)o	frequent headache	27 (38.0%)	19 (40.4%)	8 (33.3%)	p=0.56
9)p	other muscle, nerve problems	12 (16.9%)	9 (19.2%)	3 (12.5%)	p=0.48

* Statistical significance of difference between current & former residents
** Significant difference
f Fishers Exact Test 1-tailed, instead of Chi-Square, because of small numbers

Table 2, (cont'd)

Summary,
Symptoms Occuring More Frequently In Current Residents
Than In Past Residents

Statistically significant

- Eye burning, injury, double vision, loss of sight
- Dry, itchy skin

Less than statistical significance

- Eye pain or irritation
- skin rash
- cough, ongoing
- daily morning cough producing phlegm
- shortness of breath
- chest pains
- wheezing
- heart/circulatory problems
- bone/joint complaints
- loss of muscle strength

Table 3

Physician's Abnormal Findings on Physical Examination

Specific Condition (Questionaire Item #)	Current Bayway Residents N=47	Former Bayway Residents N=24	Statistical Significance of difference p of Fisher's Exact Test
Extremities Clubbing	0 (10.1)	1 (4.2%)	p=0.34
Skin Rash or other abnormalities (11.4 to 11.5)	10 (21.3%)	5 (20.8%)	p=0.61
Nose Mucosal Abnormalities (14.1 to 14.4)	7 (14.9%)	1 (4.2%)	p=0.17
Chest Percussion Abnormal	3 (6.4%)	1 (4.2%)	p=0.58
Ausculation Wheezing or other abnormal breath sounds (20.1 to 20.8)	7 (14.9%)	2 (8.3%)	p=0.35
Abnormal Palpation Tenderness right upper quadrant, or enlarged liver (22.1 and 22.4)	1 (2.1%)	0	p=0.66
CNS Reflexes Abnormal (23 through 25, and 26.1)	6 (12.8%)	0	p=0.08
Other Abnormalities	2 (27.1%)	0 (4.3%)	p=0.43

Table 4

Laboratory Test Results

Lab Test	Current Bayway Residents (%)	Former Bayway Residents (%)	Belleville Residents (%)	Statistical Comparison of pooled Bayway vs Belleville. P of Fishers exact test
Serum Creatinine				
Usual range (< 1.70 mg/dl)	39 (100.0%)	12 (100.0%)	505 (99.4%)	p=0.75
Above range (>1.70 mg/dl)	0	0	3 (0.6%)	
Attribute Not Measured	8	12	172	
Serum Gamma-Glutamyl Transpeptidase				
Normal (<70 units/l)	35 (89.7%)	12 (100.0%)	489 (96.6%)	p=0.12
Elevated* (>70 units/l)	4* (10.3%)	0	17 (0.4%)	
Attribute Not Measured	8	12	174	
White Blood Cell Count				
Normal (> 3.5 cells thousand/cu.mm)	39 (100.0%)	12 (100.0%)	507 (100.0%)	--
Diminished (<3.5 cells thousand/cu.mm)	0	0	0	
Attribute not measured	8	12	173	

Table 4 (cont.)

Urinary Phenol Levels				
Usual Range (<20 ppb)	39 (83.0%)	18 (78.3%)	211 (86.8%)	p=.17
Above Range (> 20 ppb)	8 (17.0%)	5 (21.7%)	32 (13.2%)	
Attribute Not Measured	0	1	437	

Other tests, not revealing abnormalities, nor differences between groups

Hemoglobin, hematocrit, other aspects of complete blood count

Blood lead, erythrocyte protoporphyrin (measuring lead poisoning and certain anemias)

Other tests on blood chemical screens

Table 5

LUNG FUNCTION
BY CURRENT VS. FORMER BAYWAY RESIDENTS
BY SMOKING STATUS

FVC = FORCED VITAL CAPACITY

Smoking Status	Current Residents			Former Residents			Significance * of difference in frequency of abnormal lung function tests
	Normal	Borderline	Abnormal	Normal	Borderline	Abnormal	
Never Smoked	14	3	1	11	1	0	p=0.60
(%)	(77.8%)	(16.7%)	(5.5%)	(91.7%)	(8.3%)		
Former Smoker	6	1	2	2	0	0	p=0.65
(%)	(66.7%)	(11.1%)	(22.2%)	(100.0%)			
Current Smoker	14	2	2	5	0	0	p=0.60
(%)	(77.8%)	(11.1%)	(11.1%)	(100.0%)			

FEV/FVC = FORCED EXPIRATORY VOLUME/FORCED VITAL CAPACITY

Never Smoked	10	7	1	11	1	0	p=0.60
(%)	(55.6%)	(38.9%)	(5.6%)	(91.7%)	(8.3%)		
Former Smoker	5	2	2	2	0	0	p=0.65
(%)	(55.6%)	(22.2%)	(22.2%)	(100.0%)			
Current Smoker	9	7	2	2	2	1	p=0.54
(%)	(50.0%)	(38.9%)	(11.1%)	(40.0%)	(40.0%)	(20.0%)	

* Fishers Exact Test

Table 5 (Continued)

FORCED MID-EXPIRATORY FLOW (FEF 25% - 75%)

Smoking Status	Current Residents			Former Residents			Significance * of difference in frequency of abnormal lung function tests
	Normal	Borderline	Abnormal	Normal	Borderline	Abnormal	
Never Smoked (%)	11 (64.7%)	2 (11.8%)	4 (23.5%)	10 (83.3%)	0	2 (16.7%)	p=0.51
Former Smoker (%)	5 (55.6%)	1 (11.1%)	3 (33.3%)	2 (100.0%)	0	0	p=0.51
Current Smoker (%)	10 (55.6%)	0	8 (44.4%)	3 (60.0%)	0	2 (40.0%)	p=0.63

Table 6A

Frequency of Self-Assessed Symptoms
Which Occurred At Least Once During the Previous Year--
Comparision of Bayway Subjects to Belleville Subjects

Symptom Groups

Type of Condition	Belleville Residents	Bayway Residents	P of Chi-square*
Eye	471 (69.3%)	49 (69.0%)	p=0.93
Skin	451 (66.3%)	51 (71.8%)	p=0.42
Respiratory	567 (83.4%)	66 (93.0%)	p=0.05**
CNS	559 (82.2%)	56 (78.9%)	p=0.59
Urinary	144 (21.2%)	29 (40.8%)	p=0.0003**
Gastro-intestinal	450 (66.2%)	46 (64.8%)	p=0.92

* Statistical significance of difference between Bayway and Belleville subjects
** Statistically significant difference

Table 6B

Frequency of Abnormal
Lung Function Tests-
Comparision of Bayway to Belleville

Test	Abnormal Belleville Residents(%)	Abnormal Bayway Residents(%)	P of Statistical test
FVC			
Nonsmokers	20 (6.3%)	1 (3.3%)	p=0.44 f
Former smokers	7 (5.6%)	2 (18.2%)	p=0.16 f
Current smokers	8 (4.1%)	2 (8.3%)	p=0.28 f
FEV/FVC			
Nonsmokers	8 (2.5%)	1 (3.3%)	p=0.56 f
Former smokers	6 (4.8%)	2 (18.2%)	p=0.13 f
Current smokers	16 (8.2%)	3 (13.0%)	p=0.33 f
FEF 25-75			
Nonsmokers	56 (17.9%)	6 (20.7%)	p=0.91 c
Former smokers	20 (16.1%)	3 (27.3%)	p=0.28 f
Current smokers	40 (20.7%)	10 (50.0%)	p=0.006 f*

c = chi square
f = Fisher's exact test
* = statistically significant

Table 7

ESTIMATED INDUSTRIAL EMISSIONS,
FACILITIES NEAR RELOCATED BAYWAY (DEP,1980)*

SUBSTANCE	STACK EMISSIONS (lbs/yr.)	FUGITIVE EMISSIONS (lbs/yr.)
Croda Storage Inc.		
2-nitrophenol	0.1	10
1,1,1-trichloroethane	15,000	0
Reichhold Chemicals, Inc.		
Toluene	10,000	500
Ethyl benzene	350	50
Formaldehyde	8,000	760
Maleic anhydride	8,000	790
Benzene*	960,000	16,000
Exxon Chemical Americas		
Maleic anhydride	1,300	100
Phenol	2,230	10
Exxon Bayway Refinery		
Benzene	-	20,000
Toluene	-	80,000
Ethyl Benzene	-	15,000
Naphthalene	-	2,500
Phelps Dodge Copper Products		
Methylene chloride	0	51,000
Tetrachloroethylene	0	8,400

* Benzene use at Reichhold curtailed by early 1982; other data considered accurate through 1982.

TABLE 8

SUMMARY OF SELECTED VOLATILE ORGANIC SUBSTANCE CONCENTRATIONS IN NEW JERSEY, 1979

	ELIZABETH					SOUTH AMBOY				
	All Samples			Quantifiable Samples		All Samples			Quantifiable Samples	
	# of Samples	Avg Conc	Range	# of Samples	Avg Conc	# of Samples	Avg Conc	Range	# of Samples	Avg Conc
Chloroform	54	0.00	0-0.01	0	-	40	0.00	-	0	-
Carbon Tetrachloride	54	0.02	0-0.10	0	-	40	0.01	0-0.10	0	-
1,2-Dichloroethane	54	0.04	0-2.2	1	2.10	40	0.00	0-0.01	0	-
1,1,2-Trichloroethane	54	0.22	0-11.0	2	6.02	40	0.00	-	0	-
1,2-Dibromoethane	42	0.21	0-2.7	9	0.96	39	0.00	0-1.5	4	0.79
1,1,2,2-Tetrachloroethane	54	0.15	0-4.2	2	4.06	40	0.00	0-0.01	0	-
Vinyl Chloride	13	0.05	0-0.61	1	0.61	13	0.02	0-0.17	1	0.17
Trichloroethylene	54	0.76	0-6.4	26	1.57	40	0.40	0-8.3	10	1.91
Tetrachloroethylene	54	1.54	0-14	39	2.11	40	0.22	0-2.2	11	0.93
2-Chloro-1,3-butadiene	54	0.28	0-4.0	22	0.69	40	0.02	0-0.49	5	0.16
1,1-Dichloroethylene	54	0.00	0-0.01	0	-	40	0.00	0-0.01	0	-
Benzene	54	7.20	0-72	51	7.62	40	1.30	0-8.8	41	1.62
Toluene	54	7.04	0-85	51	7.46	40	2.24	0-9.7	42	2.56
Chlorobenzene	54	0.82	0-9.1	45	0.98	40	0.26	0-3.9	24	0.51
Nitrobenzene	54	0.00	-	0	-	40	0.00	-	0	-
Ortho xylene	42	1.78	0.01-18	39	1.91	39	0.45	0-4.4	31	0.56
Para/meta xylenes	42	5.10	0.10-51	39	5.50	39	1.21	0-11	33	1.43
1,4-Dioxane	36	0.00	-	0	-	32	0.00	0-0.01	0	-
Methyl ethyl ketone	36	0.00	-	0	-	32	0.00	-	0	-
Methyl isobutyl ketone	36	0.03	0-1.0	2	0.56	32	0.00	0-0.01	0	-

Concentrations reported in parts per billion by volume

Zero quantities and quantities estimated as traces are not included in the quantifiable sample averages but are included in the all-sample averages.

TABLE 8 (cont.)

SUMMARY OF SELECTED VOLATILE ORGANIC SUBSTANCE CONCENTRATIONS IN NEW JERSEY, 1979

	RUTHERFORD					NEWARK				
	All Samples			Quantifiable Samples		All Samples			Quantifiable Samples	
	# of Samples	Avg Conc	Range	# of Samples	Avg Conc	# of Samples	Avg Conc	Range	# of Samples	Avg Conc
Chloroform	46	0.00	0-0.01	0	-	50	0.00	0-0.01	0	-
Carbon tetrachloride	46	0.03	0-0.10	0	-	50	0.02	0-0.10	0	-
1,2-Dichloroethane	46	0.01	0-0.59	1	0.59	50	0.00	0-0.01	0	-
1,1,2-Trichloroethane	46	0.00	0-0.01	0	-	50	0.00	0-0.01	0	-
1,2-Dibromoethane	37	0.24	0-3.5	8	1.00	43	0.10	0-1.2	8	0.55
1,1,2,2-Tetrachloroethane	46	0.06	0-2.3	2	1.36	50	0.06	0-2.0	2	1.42
Vinyl chloride	13	0.03	0-0.32	2	0.19	11	0.04	0-0.57	1	0.57
Trichloroethylene	46	1.15	0-8.6	28	1.09	50	0.25	0-1.9	14	0.86
Tetrachloroethylene	46	1.10	0-9.2	36	1.40	50	0.98	0-32	21	2.12
2-Chloro-1,3-butadiene	46	0.16	0-2.9	19	0.39	50	0.04	0-0.41	11	0.16
1,1-Dichloroethylene	46	0.00	-	0	-	51	0.00	-	0	-
Benzene	46	3.16	0.01-19	44	3.30	50	1.70	0.01-10.6	49	1.71
Toluene	46	8.40	0.01-33	45	8.59	50	2.62	0.01-13	48	2.71
Chlorobenzene	46	0.67	0-12	30	0.81	50	0.39	0-5.7	35	0.55
Nitrobenzene	46	0.00	0-0.01	0	-	50	0.00	-	0	-
Ortho xylene	37	1.32	0-4.5	34	1.44	43	1.06	0.01-10.1	39	1.17
Para/meta xylenes	37	3.72	0.10-13	36	3.82	43	2.52	0.01-33	41	2.65
1,4-Dioxane	27	0.00	-	0	-	31	0.00	-	0	-
Methyl ethyl ketone	29	0.00	-	0	-	31	0.00	-	0	-
Methyl isobutyl ketone	27	0.01	0-0.25	1	0.25	31	0.00	0-0.01	0	-

Concentrations reported in parts per billion by volume

Zero quantities and quantities estimated as traces are not included in the quantifiable sample averages but are included in the all-sample averages.

TABLE 8 (cont.)

NJIT AIR POLLUTION RESEARCH LAB

TOXIC METALS IN AIRBORNE PARTICULATES
GENERAL AREA - CAMDEN

3-MONTH AVERAGES
CONCENTRATIONS IN NANOGRAMS PER CUBIC METER

	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
LEAD	********	609.23	788.23	829.29
ARSENIC	********	237.03	67.43	0.00
CADMIUM	********	10.62	2.36	4.66
MANGANESE	********	70.03	47.74	83.37
NICKEL	********	21.91	26.96	30.70
MERCURY	********	3.54	0.81	0.74

******** = NO ANALYSIS
0.00 = BELOW DETECTION LIMIT

TOXIC METALS IN AIRBORNE PARTICULATES
GENERAL AREA - ELIZABETH

3-MONTH AVERAGES
CONCENTRATIONS IN NANOGRAMS PER CUBIC METER

	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
LEAD	********	1009.88	1296.15	1148.32
ARSENIC	********	120.44	50.58	286.40
CADMIUM	********	3.02	6.72	5.27
MANGANESE	********	23.16	24.06	24.87
NICKEL	********	40.25	22.32	22.25
MERCURY	********	1.15	0.31	0.38

******** = NO ANALYSIS
0.00 = BELOW DETECTION LIMIT

NJIT AIR POLLUTION RESEARCH LAB

TOXIC METALS IN AIRBORNE PARTICULATES
GENERAL AREA - LINDEN

3-MONTH AVERAGES
CONCENTRATIONS IN NANOGRAMS PER CUBIC METER

	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
LEAD	535.67	922.00	********	********
ARSENIC	177.01	372.00	********	********
CADMIUM	4.08	16.40	********	********
MANGANESE	28.86	19.90	********	********
NICKEL	8.83	0.00	********	********
MERCURY	0.23	0.00	********	********

******** = NO ANALYSIS
0.00 = BELOW DETECTION LIMIT

TOXIC METALS IN AIRBORNE PARTICULATES
GENERAL AREA - NEWARK

3-MONTH AVERAGES
CONCENTRATIONS IN NANOGRAMS PER CUBIC METER

	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
LEAD	911.57	1091.57	1323.74	1752.93
ARSENIC	260.28	163.19	464.33	********
CADMIUM	5.76	17.17	14.00	11.14
MANGANESE	21.19	25.90	31.44	30.80
NICKEL	10.59	47.21	39.51	25.50
MERCURY	0.79	0.06	0.45	0.43

******** = NO ANALYSIS
0.00 = BELOW DETECTION LIMIT

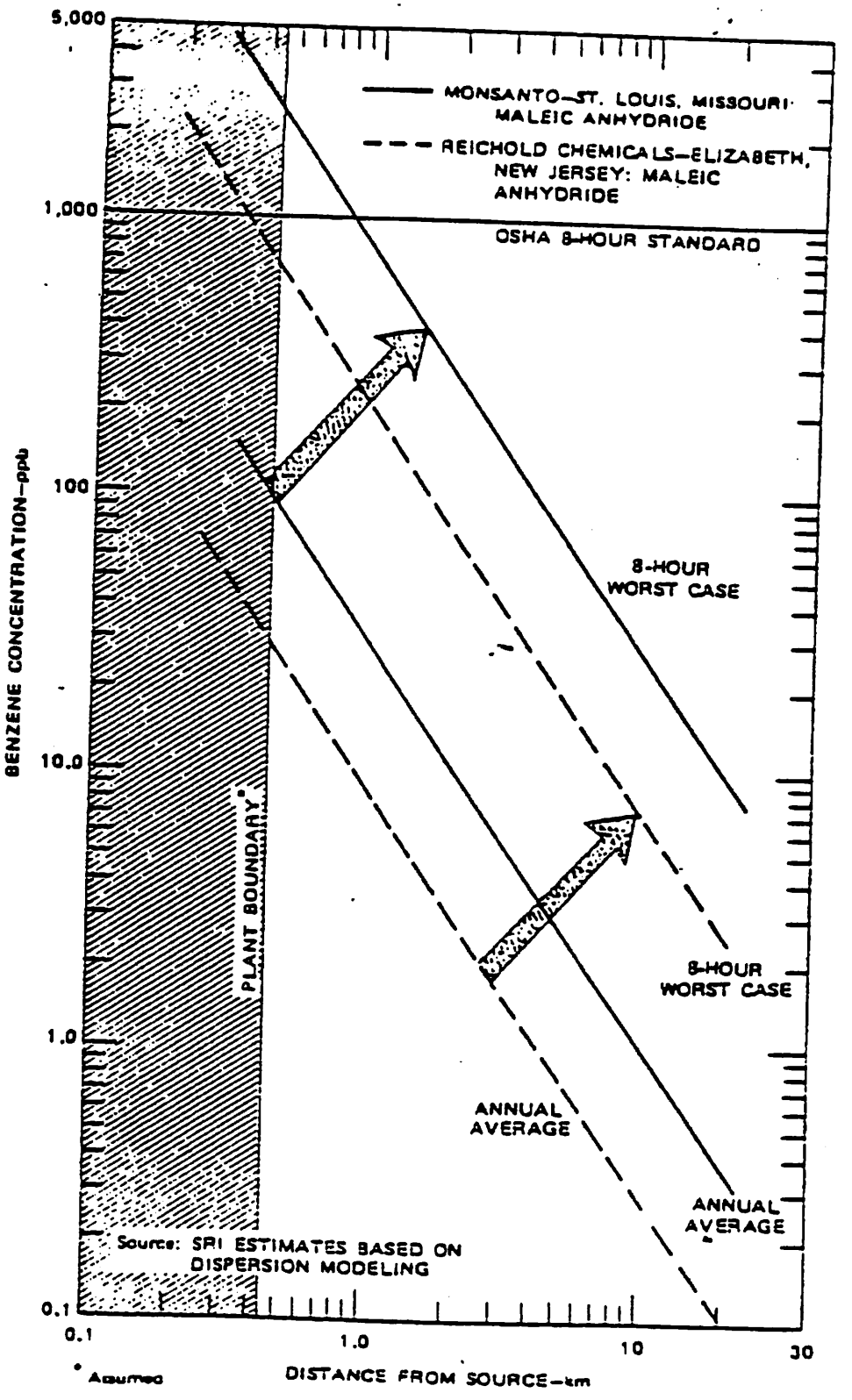
Low and High Levels of Target PAH Found at Four Sites.

	Newark		Rutherford		Elizabeth		Camden	
	Low	High	Low	High	Low	High	Low	High
Cyclopenta(cd)pyrene	06	1.50-2.25	.18	1.55	.19.-41	-	.11-.15	.85-1.21
Benz(a)anthracene	.10	1.42	.02-04	1.31-2.17	.23	.62-.92	.12-.16	2.48-3.11
Benzo(e)pyrene	.36	3.37	.29	5.63	.48	1.48	.20	3.27
Benzo(j)fluoranthene	.12	2.32	.17	3.31	.23	1.27	.15	2.15
Benzo(k)fluoranthene	.05	2.60-3.03	.05-.10	1.84-2.15	.12-.15	1.38	.20	2.23-3.17
Benzo(a)pyrene	.06	3.38-3.92	.06	3.52-4.09	.10	1.62-2.00	.12	2.33-2.86
Benzo(ghi)perylene	.24	9.11	.10	6.33	.17	3.06	.16	4.21
Coronene	.11	4.01	.19	2.60	.20	1.38	.19	1.51

TABLE 8 (cont.)

FIGURE - E.P.A.

ESTIMATED BENZENE LEVELS



COMPARISON BETWEEN PREDICTED ANNUAL AVERAGE AND 8-HOUR WORST CASE BENZENE CONCENTRATIONS IN THE VICINITY OF TWO CHEMICAL MANUFACTURING FACILITIES

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APPENDICES

APPENDIX A SURVEY FORM

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SURVEY

SECTION - A

QUESTIONNAIRE/ HOUSEHOLD ID NO. ____ ____ ____ ____	RESPONDENT ID NO. ____ ____

GENERAL

NEW JERSEY STATE
DEPARTMENT OF HEALTH

PS165

OCCUPATIONAL AND ENVIRONMENTAL
HEALTH SURVEY

SECTION A - GENERAL

1. Questionnaire/Household Ident. No. ____ ____ ____ ____	2. Respondent Ident. No. ____ ____
3. Study Number ____ ____ ____ ____	4. Census Tract ____ ____ ____
5. Block ____ ____ ____ ____ / ____ ____ ____ ____	6. Lot Number ____ ____ ____ ____ / ____ ____ ____ ____
7. Interviewer Code ____ ____ ____	8. Type Interview: 1. ☐ Personal 2. ☐ Telephone 3 ☐ Other-Specify ____
9. Respondent's Name (Also enter on Page C1.)	Respondent's Name / Respondent's Name
10. Current Address (include Apt. No.)	

11. City	12. County	13. State	14. Zip Code

15. Is this your mailing address?
_____Yes _____No (If "No" fill in below.)

16. Address (include Apt. No.)

17. City	18. County	19. State	20. Zip Code

CONSENT

I have been informed that the New Jersey State Department of Health is conducting a study of environmental factors and their effect on the health of individuals. This study involves obtaining information from me about my residence, occupation, and health, as well as some information about other substances I may have been exposed to. The interview will require approximately one hour of my time. I understand it may be necessary to contact me again.

I have agreed to take part in this study and to give information to the interviewer understanding that:

1. My responses will be kept completely confidential.
2. My participation is voluntary and I am free to discontinue participation at any time.
3. The information in this study will be summarized by the New Jersey State Department of Health to determine whether environmental factors in this area may contribute to health problems.

Time Interview Began _____AM _____PM		Date
Name of Participant (Print)	Signature	Date
Name of Participant (Print)	Signature	Date

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SURVEY

SECTION - D

QUESTIONNAIRE/ HOUSEHOLD ID NO. ____ ____ ____ ____	RESPONDENT ID NO. ____ ____

OCCUPATIONAL HISTORY

NEW JERSEY STATE
DEPARTMENT OF HEALTH

P5165

OCCUPATIONAL HISTORY

Name ______________________ Respondent I.D. No. __________

Now I would like some information about each of the jobs, part time or full time, that you have (Your________had) held for three months or more after completing your education. Please include work in the armed services. We will start with your first full time job after leaving school and come up to your (his/her) most recent job.

If Respondent says she/he/deceased has never worked, check here ( ) and go to page D-3. Otherwise, Ask Q. 1 through Q. 8 For each job.

On the most recent job, when, (you ________) worked as a ____________ did you (He/She) wear ~~protective clothing~~ or equipment ☐Yes ☐No

Put C in current job	Q-1 What was the name and address of the Company/Employer you worked for? Q-2 What did they do or manufacture? Q-3 What was your job title?	Q-4 Mo/Yr Start Q-5 Mo/Yr Stop Q-6 Was job full time or part time	Q-7 What were the duties?	Q-8 Were you exposed to Solvents, Fumes, etc.? (Show Card)
FIRST JOB	1. 2. 3.	4. 5. 6. ☐ Part-Time ☐ Full-Time	7.	8. ☐Yes–Specify ☐No
	1. 2. 3.	4. 5. 6. ☐ Part-Time ☐ Full-Time	7.	8. ☐Yes–Specify ☐No
	1. 2. 3.	4. 5. 6. ☐ Part-Time ☐ Full-Time	7.	8. ☐Yes–Specify ☐No
	1. 2. 3.	4. 5. 6. ☐ Part-Time ☐ Full-Time	7.	8. ☐Yes–Specify ☐No
	1. 2. 3.	4. 5. 6. ☐ Part-Time ☐ Full-Time	7.	8. ☐Yes–Specify ☐No
	1. 2. 3.	4. 5. 6. ☐ Part-Time ☐ Full-Time	7.	8. ☐Yes–Specify ☐No
	1. 2. 3.	4. 5. 6. ☐ Part-Time ☐ Full-Time	7.	8. ☐Yes–Specify ☐No

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SURVEY

SECTION - E

QUESTIONNAIRE/ HOUSEHOLD ID NO. ___ ___ ___ ___	RESPONDENT ID NO. ___ ___

SMOKING AND ALCOHOL HISTORY

NEW JERSEY STATE

DEPARTMENT OF HEALTH

1=Yes-2=No or Number

CIGARETTES

1. Have you every smoked cigarettes? (Yes means 20 or more packs of cigarettes or 12 or more ounces of tobacco in a lifetime or one or more cigarettes a day for one year.)

   1. Yes 2. No (If No, go to Question 8.) _____

2. Do you now smoke cigarettes (as of one month ago)? 1. Yes 2. No _____

3. How old were you when you first started regular cigarette smoking? _____

   If Question 2 was No, ask:

4. If you have stopped smoking cigarettes completely, how old were you when you stopped? _____

5. How many cigarettes did you smoke per day during the time in question? _____

6. On the average of the entire time you smoked, how many cigarettes did you smoke per day? _____

7. Do or did you inhale the cigarette smoke:

   1. Not at all 2. Slightly 3. Moderately 4. Deeply _____

PIPE SMOKING

8. Have you ever smoked a pipe? (Yes means more than 12 ounces of tobacco in a lifetime.)

   1. Yes 2. No (If No, go to Question 15.) _____

9. Do you now smoke a pipe (as of one month ago)? 1. Yes 2. No _____

10. How old were you when you first started regular pipe smoking? _____

    If Question 9 was No, ask:

11. If you have stopped smoking a pipe completely, how old were you when you stopped? _____

12. How many pipe fulls did you smoke per day during the time in question? _____

13. On the average of the entire time you smoked, how many pipe fulls did you smoke per day? _____

14. Do or did you inhale the pipe smoke?

    1. Not at all 2. Slightly 3. Moderately 4. Deeply _____

CIGARS

15. Have you ever smoked cigars? (Yes means more than one cigar per week for a year.)

    1. Yes 2. No , (If No, go the next Question.) _____

16. Do you now smoke cigars (as of one month ago)? 1. Yes 2. No _____

17. How old where you when you first started regular cigar smoking? _____

    If Question 16 was No, ask:

18. If you have stopped smoking a pipe completely, how old were you when you stopped? _____

19. How many cigars did you smoke per day during the time in question? _____

20. On the average of the entire time you smoked, how many cigars did you smoke per day? _____

21. Do or did you inhale the cigar smoke?

    1. Not at all 2. Slightly 3. Moderately 4. Deeply

ALCOHOL BEVERAGES

1. During the time in question, how many days a week do (did) you usually drink beer? _____ day(s)

2. During the time in question, when you drink beer, how many do (did) you drink a day? _____

3. During the time in question, about how many days a week do (did) you usually drink wine? _____ day(s)

   (If No, for 1.- 3. Go to Question 7.)

4. During the time in question, when you drink wine how many glasses do (did) you drink a day? _____

5. During the time in question, how many days a week do (did) you usually have drinks such as whiskey, vodka or gin? _____ day(s)

6. During the time in question, when you have these drinks, how many do (did) you usually have in a day? _____

   TOTAL _____

7. a. Do or did you ever have a drinking problem? 1. ☐ Yes 2. ☐ No

   b. If Yes, When: _____ to _____

   c. How many days per week did you drink? _____ day(s)

   d. How many drinks did you have in a day? _____

MEDICAL HISTORY

I would like to ask you some questions about your health. These will include specific questions about diagnoses that a doctor may have given you, symptoms you may have had, and general questions about your health practices.

1. In general, how would you say your health is these days? Would you say your health is good, or not too good?

   1. ___ Good 2. ___ Not Good

2. Have you ever been told by a doctor that you had any of the following conditions? If yes, continue with questions in column headings Q-C through Q-D.

A Condition	Q B Advised By Doctor		Q C When Was It First Diagnosed		Q D Are You Being Treated Now	
	Yes	No	Mo.	Yr.	Yes	No
CARDIOVASCULAR						
13. Heart Murmur						
12. Angina						
12. Heart Attack						
13. Other Heart Condition – Specify						
11. High Blood Pressure						
12. Claudication (Circulation other than Heart)						
13. Phlebitis						
PULMONARY						
24. Pneumonia						
24. Pleurisy						
21. Asthma						
22. Chronic Bronchitis						
23. Emphysema						
24. Bronchiectasis						
26. Pulmonary Tuberculosis						
25. Work Related Lung Condition, i.e., Dust on Lungs, Silicosis or Pneumoconioses						
26. Rib Fracture 1. ☐ Right 2. ☐ Left						
26. Other - Specify						
GASTROINTESTINAL						
31. Gastric Ulcer Diagnosed By: UGIS						
31. : Hemorrhage						
31. Duodenal Ulcer Diagnosed By: UGIS						
31. : Hemorrhage						
31. Bleeding Ulcer						
32. Other GI Bleeding						

MEDICAL HISTORY

Condition	Q B Advised By Doctor		Q C When Was It First Diagnosed		Q D Are You Being Treated Now	
	Yes	No	Mo.	Yr.	Yes	No
GASTROINTESTINAL. (Cont'd.)						
32. Hiatus Hernia						
32. Inguinal Hernia						
33. Jaundice						
33. Gallbladder Disease						
33. Liver Disease						
33. Enlarged Liver						
33. Cirrhosis						
32. Appendix Removal						
32. Ulcerative Colitis						
32. Diverticulitis						
32. Other GI – Specify						
GENITOURINARY						
41. Urinary Infection						
41. Kidney Infection						
42. Kidney Stones						
42. Prostate Enlargement						
42. Blood in Urine Not Caused by Any of Above						
42. Protein in Urine Not Caused by Any of Above						
42. Other Genitourinary – Specify						
SKIN						
44. Psoriasis						
43. Eczema						
44. Hives						
43. Other Skin – Specify						
BLOOD						
52. Anemia						
51. Low White Blood Count						
53. Blood Clotting or Bleeding Problems						
53. Sickle Cell						
53. Thalessemia						
53. Other Blood – Specify						
EYE						
55. Blindness in One or Both Eyes						

MEDICAL HISTORY

Condition	Q B Advised By Doctor		Q C When Was It First Diagnosed		Q D Are You Being Treated Now	
	Yes	No	Mo.	Yr.	Yes	No
EYE. (Cont'd.)						
55. Glaucoma						
55. Cataracts						
55. Weak or Lazy Eye						
55. Optic Neuritis						
55. Other Eye. – Specify						
EAR, NOSE AND THROAT						
61. Sinus Problems						
63. Impaired Hearing						
61. Nasal Allergies						
62. Ear Infection						
61. Hay Fever						
61. Nasal Polyps						
61. Laryngeal Polyps						
63. Tonsils Removed						
63. Other ENT – Specify						
NERVOUS SYSTEM						
72. Epilepsy Seizure or Convulsions						
72. Stroke						
72. Parkinson's Disease						
71. Nervous Disorder						
72. Other Nervous – Specify						
MUSCULOSKELETAL						
81. Rheumatoid Arthritis						
81. Other Arthritis – Specify						
82. Back Injury						
82. Degenerative Disc Disease						
82. Bone Lesions						
82. Other Musculoskeletal – Specify						
GENERAL AND METABOLIC						
92. Thyroid or Goiter						
91. Diabetes						
92. Gout						
92. Other – Specify						

MEDICAL HISTORY

Condition	Q B Advised By Doctor		Q C When Was It First Diagnosed		Q D Are You Being Treated Now	
	Yes	No	Mo.	Yr.	Yes	No
CANCER						
01. Skin Cancer						
02. Throat Cancer						
02. Lung Cancer						
02. Stomach Cancer						
02. Bowel or Colon Cancer						
02. Rectum Cancer						
02. Prostate Cancer						
02. Breast Cancer						
02. Cervical Cancer						
02. Cancer of the Uterus						
03. Leukemia						
02. Hodgkins Disease						
02. Other Lymphoma						
02. Liver Cancer						
02. Bladder Cancer						
02. Other Cancer – Specify						

MEDICAL CARE

99. One year prior to time in question, has any illness, pain or health condition caused you to: (exclude pregnancies)

	Yes	No	If Yes, No. of Days	Type Illness
a. Stay in a hospital overnight or longer	☐	☐	_____	_____
b. Visit a physician or medical facility	☐	☐	_____	No. of Visits
c. Stay in bed all day	☐	☐	_____	
d. Miss any work or other usual activity	☐	☐	_____	

100. Have you ever been hospitalized (excluding pregnancies)? ☐ Yes ☐ No If Yes, complete below.

	YEAR	REASON
a.	_____	_____
b.	_____	_____
c.	_____	_____
d.	_____	_____
e.	_____	_____
f.	_____	_____

OCCUPATIONAL AND ENVIRONMENTAL

HEALTH SURVEY

SECTION - G

QUESTIONNAIRE/ HOUSEHOLD ID NO. ___ ___ ___ ___	RESPONDENT ID NO. ___ ___

MEDICATION HISTORY

NEW JERSEY STATE

DEPARTMENT OF HEALTH

MEDICATION HISTORY

1. During the time in question, did you take any of the following medication?

Check Type Being Taken:

1. ☐ Antibiotics for More than two weeks
2. ☐ Antibiotics for Less than two weeks
3. ☐ Anti-Convulsants (Epilipsey Medicine)
4. ☐ Antihistamines (Allergy Medicine)
5. ☐ Anti-Inflammatories
6. ☐ Aspirins or Tylenol More than once a week
7. ☐ Blood Thinners (Anti-Coagulants)
8. ☐ Broncho-Dilators (Breathing Medicine)
9. ☐ Decongestants (Cold Medicine)
10. ☐ Digitalis
11. ☐ High Blood Pressure Pills
12. ☐ Insulin
13. ☐ Laxatives
14. ☐ Medication for Arthritis
15. ☐ Medication to Lower Fat in Blood
16. ☐ Medication for the Nerves
17. ☐ Nitroglycerine
18. ☐ Other Cardiac Medication
19. ☐ Oral Diabetic Medication
20. ☐ Pain Medicine
21. ☐ Radiotherapy
22. ☐ Sleeping Pills for More than three times a week
23. ☐ Steroids-Oral
24. ☐ Steroids-Topical
25. ☐ Thyroid Medication
26. ☐ Tranquilizers
27. ☐ Tuberculosis Medication
28. ☐ Water Pills (Diuretic)
29. ☐ Other-Specify _____
30. ☐ _____
31. ☐ _____
32. ☐ _____

INTERVIEWER ONLY:

Are prescribed medications being taken? ☐ Yes ☐ No

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SURVEY

SECTION - I

QUESTIONNAIRE/ HOUSEHOLD ID NO. ___ ___ ___ ___	RESPONDENT ID NO. ___ ___

SYMPTOMATOLOGY

NEW JERSEY STATE

DEPARTMENT OF HEALTH

SYMPTOMATOLOGY

FREQUENCY NUMBER:

1 = Nearly Every Day (3 or more days a week)
2 = Once Or Twice A Week
3 = Once or Twice a Month
4 = Less Than Once A Month
5 = Seasonally
9 = Never

1. Starting with your EYES, during the past twelve months, how often have you had any:

	Frequency No.		Frequency No.
a. Irritation of the Eyes	_____	e. Sudden loss of sight	_____
b. Burning Eyes	_____	f. Any other Eye problems, specify: _____	_____
c. Redness of the Eyes	_____		
d. Blurred or double vision	_____		

2. Now about your SKIN, during the past twelve months have you had any:

	Frequency No.		Frequency No.
a. Rash	_____	d. Trouble with acne	_____
b. Trouble with dry or itching Skin	_____	e. Any other problem with your Skin, specify: _____	_____
c. Skin growth or tumor	_____		

3. Now about your STOMACH AND DIGESTIVE SYSTEM, during the past twelve months, have you had:

	Frequency No.		Frequency No.
a. Indigestion or heartburn	_____	f. Rectal bleeding	_____
b. Stomach cramps or pain	_____	g. Change in bowel habits	_____
c. Diarrhea	_____	h. Any other problems with your stomach or intestinal system, specify: _____	_____
d. Constipation	_____		
e. Rectal burning or pain	_____		

4. Now about your LUNGS AND RESPIRATORY SYSTEM, during the past twelve months, have you had:

	Frequency No.		Frequency No.
a. A cough that lasted more than 3 months	_____	e. Cough with blood	_____
b. A daily cough when you first get up in the morning	_____	f. Nasal stuffiness or runny nose	_____
c. To bring up phlegm when you first get up in the morning	_____	g. Sore throat	_____
d. Shortness of breath that makes you stop work or usual activity	_____	h. Wheezing or whistling sounds in your chest	_____
		i. repeated pain, pressure or tight feeling in your chest	_____

FREQUENCY NUMBER:

1 = Nearly Every Day (3 or more days a week)
2 = Once Or Twice A Week
3 = Once or Twice A Month
4 = Less Than Once A Month
5 = Seasonally
9 = Never

4. LUNGS AND RESPIRATORY SYSTEM (Continued)

	Frequency No.		Frequency No.
j. More than 3 colds or upper respiratory infections	_____	k. Any other problem with your Lungs or Respiratory System, specify: _____	_____

5. Now about your KIDNEYS AND BLADDER, during the past twelve months, have you had:

	Frequency No.		Frequency No.
a. Pain when urinating	_____	f. Loss of bladder control	_____
b. Increase in number of times urinated per day	_____	g. Any other problem with your Kidneys or Bladder, specify: _____	_____
c. Trouble starting or stopping urinating	_____		
d. Blood in your urine	_____		

6. Finally, during the past twelve months have you had any of the following:

	Frequency No.		Frequency No.
a. Persistent tiredness or weakness	_____	j. Nausea	_____
b. Loss of muscle strength	_____	k. Sore throat	_____
c. Paralysis	_____	l. Unusual sensations like pins and needles	_____
d. Numbness or loss of sensation	_____	m. Loss of consciousness, fainting or coma	_____
e. Tremors or uncontrolled movement	_____	n. Spells of feeling very upset, depressed or crying	_____
f. Difficulty in walking	_____	o. Headaches	_____
g. Difficulty in writing	_____	p. Any other problems with your muscles or nerves, specify: _____	_____
h. Difficulty in sleeping	_____		
i. Dizziness	_____		

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SURVEY

SECTION - J

QUESTIONNAIRE/ HOUSEHOLD ID NO. ____ ____ ____ ____	RESPONDENT ID NO. ____ ____

ADULT PHYSICAL EXAMINATION

NEW JERSEY STATE

DEPARTMENT OF HEALTH

ADULT PHYSICAL EXAMINATION

1. Blood Pressure
   1. Pressure Reading _____
2. Pulse Rate _____

☐ Results of examination are normal. Abnormalities are checked off below.

3. Heart: ☐ Regular ☐ Irregular

4. General Appearance
   1. ☐ Overweight
   2. ☐ Underweight
   3. ☐ Appears Ill
   4. ☐ Other-specify _____

5. Extremities
   1. ☐ Clubbing
   2. ☐ Cyanosis
   3. ☐ Deformed Joints/Hands
   4. ☐ Swollen, Tender Joints/Hands
   5. ☐ Crepitations
   6. ☐ Amputation
   7. ☐ Ankle edema
   8. ☐ Other-specify _____

6. Skin
   1. ☐ Seborrhea
   2. ☐ Acne
   3. ☐ Psoriasis
   4. ☐ Rash
   5. ☐ Other-specify _____

7. Eyes
   1. ☐ Pale Conjunctive
   2. ☐ Icteric Sclerae
   3. ☐ Abn. Pupils
   4. ☐ Prosthesis
   5. ☐ Other-specify _____

8. Mouth
   1. ☐ Carles/Untreated
   2. ☐ Gingivitis
   3. ☐ Edentulous
   4. ☐ Tongue abnormality
   4. ☐ Other-specify _____

9. Nose
   1. ☐ Inflamed
   2. ☐ Swollen
   3. ☐ Polyps
   4. ☐ Other-specify _____

Abnormal

10. Thyroid
    1. ☐ Enlarged
    2. ☐ Nodular
    3. ☐ Other-specify _____

11. Lymph Nodes
    1. ☐ Cervical
    2. ☐ Supraclavicular
    3. ☐ Axillary
    4. ☐ Other-specify _____

12. Breasts
    1. ☐ Multi-cystic
    2. ☐ Discrete Nodule
    3. ☐ Mastectomy
    4. ☐ Other-specify _____

13. Chest Inspection
    1. ☐ Increased A-P Diameter
    2. ☐ Kyphosis
    3. ☐ Scoliosis
    4. ☐ Other-specify _____

14. Chest Percussion
    1. ☐ Dullness Right
    2. ☐ Dullness Left
    3. ☐ Hyper-Resonant Right
    4. ☐ Hyper-Resonant Left
    5. ☐ Other-specify _____

15. Auscultation
    1. ☐ Decreased Right
    2. ☐ Decreased Left
    3. ☐ Wheezing/Rhonchi Localized
    4. ☐ Wheezing/Rhonchi Diffuse
    5. ☐ Lengthened Oxpiratory Phase
    6. ☐ Moist Rales
    7. ☐ Dry Rales
    8. ☐ Other-specify _____

16. Heart Sounds:
    1. ☐ Murmur
    2. ☐ Distant Heart Sounds
    3. ☐ Other-specify _____

Abnormal

17. Abdominal Palpation

1. ☐ Tenderness RUQ
2. ☐ Tenderness, Diffuse
3. ☐ Tenderness, Other

_____

4. ☐ Enlarged Liver

Size: _____

Description:

_____

5. ☐ Palpable Spleen

_____

6. ☐ Palpable Kidney

_____

18. Reflexes

1. ☐ Ankle Hyperactive
2. ☐ Ankle Decreased
3. ☐ Ankle Absent
4. ☐ Knee Hyperactive
5. ☐ Knee Decreased
6. ☐ Knee Absent
7. ☐ Babinski
8. ☐ Other-specify

_____

_____

19. Motor and Coordination

1. ☐ Romberg
2. ☐ Nystagmus
3. ☐ Abn. Finger to Nose
4. ☐ Adiadochoinesia
5. ☐ Other-specify

_____

Abnormal

20. Tremor

1. ☐ Outstreached Hands
2. ☐ Intentional
3. Other-specify

_____

21. Psychomotor Activity

1. ☐ Decreased
2. ☐ Other-specify _____

22. Other Significant Abnormalities from any of the above

1. ☐ Other _____

_____

_____

Those are all the questions I have for you. Is there anything else that I haven't asked you about that you think is important?

In case I've forgotten to ask you something and my supervisor needs to call you back, may I have a phone number and a convenient time?

PHONE_____ TIME ENDED_____AM PM

BEST TIME_____AM PM

Appendix B

Age-or-Sex-Standardized Rates For Pertinent Results

1. Age-standardized rates

Attribute # on Questionnaire	Current Residents of Bayway	Former Residents of Bayway	Significance of Difference in Rates
Self-Assessed Symptoms			
5) b,c daily morning cough/phlegm	61.4%	51.7%	N.S.
5) d Shortness of breath	40.9%	39.1%	N.S.
5) a cough lasting more than one month	31.7%	24.0%	N.S.
5) i chest pain, pressure, tightness	35.5%	50.5%	N.S.
5) h wheeze	11.1%	2.3%	N.S.
6) a-f heart and circulation	44.8%	43.7%	N.S.
7) a-e bones and joints	59.6%	51.7%	N.S.
9) b,c muscle strength loss	24.3%	11.5%	N.S.
3) b dry, itchy skin	57.5%	39.1%	$p<0.05$ *

Appendix B (cont'd)

1. Age-standardized rates (cont'd)

Attribute # on Questionnaire	Current Residents of Bayway	Former Residents of Bayway	Significance of Difference in Rates
Physician Diagnosed Conditions			
10) Asthma	14.5%	2.3%	$p<0.05$
8,9,13 Pheumonia, pleurisy or bronchiectasis	27.6%	5.7%	$p<0.05$ *
16,17 Other lung (+TB)	11.2%	0.0%	N.S.
42,44 Psoriasis or Hives	11.2%	0.0%	N.S.
62 Ear infections	20.2%	11.5%	N.S.
18-23 Ulcer	9.3%	0.0%	N.S.
Findings on Physical Exam			
Nose Mucosal Abnormalities (14.1 to 14.4)	13.1%	5.7%	N.S.
Ausculation Wheezing and Other abnormal breath sounds (20.1 to 20.8)	14.8%	8.1%	N.S.
CNS Reflexes abnormal (23 through 25, and 26.1)	11.2%	0.0%	N.S.

1. Age-standardized rates (cont'd)

Attribute # on Questionnaire	Current Residents of Bayway	Former Residents of Bayway	Significance of Difference in Rates
Labs			
Serum Gamma-Glutamyl Transpeptidase >70 units/l	10.1%	0.0%	p<0.05 *

2. Sex-adjusted Rates

Self-assessed symptoms	Bayway	Belleville	
Urinary	40.4%	21.3%	p<0.05 *

* Difference is statistically significant
N.S. = not statistically significant
Nole = spirometry is automatically age-and-sex adjusted