

REPORT

**A HEALTH SURVEY OF THE POPULATION LIVING NEAR THE
KRYLOWATY FARM
ABANDONED HAZARDOUS WASTE DISPOSAL SITE
CONDUCTED BY
THE ENVIRONMENTAL HEALTH PROGRAM
NEW JERSEY STATE DEPARTMENT OF HEALTH**

October 1984

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I. BACKGROUND

The following site history was taken from the consultant report "Phase I Investigation, Hydrogeology, Groundwater and Surface Water Contamination at the Krysowaty Farm Abandoned Hazardous Waste Disposal Site" - July 1982, prepared for the Township of Hillsborough by Betz-Converse-Murdoch, Inc., Consulting Engineers, Planners and Scientists.

A. GENERAL

The Krysowaty Farm abandoned hazardous waste disposal site is located in Hillsborough Township, in the extreme western section of Somerset County, New Jersey (Figure 1). The disposal site appears to be a partially-filled, east-trending ravine located on the top and extreme upper slope of a generally flat-topped, northeast-to-southwest-trending plateau. The area of disposal is roughly rectangular in plain view and measures approximately 30 feet by 100 feet, based on eyewitness accounts and backhoe excavations performed by the New Jersey Department of Environmental Protection (NJDEP). The site is not readily discernible from nearby roads or residences, due to its location and vegetative screening. Adjacent land use is primarily agricultural, consisting of unused grain fields, unused orchard, and active grain fields and dairy land located some distance from the base of the fill. Scattered woodlots and an oval-shaped marsh/meadow area are located immediately downslope of the site.

The nearest residences are located along Three Bridges Road, which parallels the South Branch of the Raritan. Topographic map inspection indicates that the closest residences are located approximately 900 feet to the northeast of the site (Figure 1). Drilled wells of unknown depth and construction are the domestic and potable water supply source for these residences.

B. DISPOSAL ACTIVITIES AND SITE HISTORY

Disposal of various chemical substances at the Krysowaty Farm site reportedly commenced around 1965 and continued on an irregular basis until approximately 1970. Because of the remote nature of the site and the apparent fact that disposal activities occurred without official notification or permitting, such activities proceeded without the knowledge of local, state, or federal authorities. Local authorities were alerted to these activities in late 1980 by an associate of Mr. Krysowaty, who by that time had passed away.

The method of disposal reportedly involved periodic filling of portions of the site with drummed materials. The drums were crushed with power equipment, and fill soil was imported to the site and used to cover the drums. Eyewitness accounts reportedly place the number of buried drums to be on the order of 200, but a precise figure cannot be determined. Tires, construction and demolition debris, stumps, and abandoned cars are also buried and/or partially exposed at the disposal site.

In July 1981, an exploratory backhoe excavation was performed at the site by NJDEP. Between 20 and 30 crushed and rusted drums and drum fragments were encountered, and 10 samples of solids were obtained. The excavation pits were then backfilled, and the top was brought to an approximate level grade. These 10 drum samples were composited, and the composite was analyzed. Laboratory analysis disclosed the presence of benzene, ethylbenzene, benzidine, and other compounds. The site was partially secured with snow fencing by Hillsborough Township, and warning signs were placed at all significant access points in February 1982.

C. SURFACE WATER HYDROLOGY

The disposal site is approximately 1,350 feet south-southwest of the South Branch of the Raritan River. Several small springs rise from the base of the disposal area, and their combined flow was estimated during late February and early March 1982 to be on the order of 10 gallons per minute (gpm). These small springs coalesce about 20 yards downslope from the base of the disposal area and flow into a low marshy area. One discrete stream leaves this marshy area through a pipe and flows southeastward about 200 yards, whereupon it swings 90 degrees to the northeast and flows into the South Branch of the Raritan. Although the stream flows through cornfields and dairy cattle pasture, it is not known if it is used for stock watering.

The seeps and waters in the marshy area at the base of the fill exhibit some discoloration; various hues of blue and green are apparent, as well as an oily surface sheen. Odors of an unknown chemical-like nature are also quite strong in the immediate area, and could be detected several hundred feet away with favorable wind conditions during the time of the field study. Vegetative mortality or stress was not evident.

D. GEOLOGY

The Krysowaty dump site is underlain by the Brunswick Formation, a series of mostly red shales of Triassic age (deposited approximately 200 million years ago). This formation, a unit of the Newark Group, underlies a broad northeast-southwest oriented belt in central New Jersey and consists primarily of red, brown, and green shales, sandstones, argillites, and diabase. The shales are mostly thinly bedded and fissile, and contain occasional sandstone interbeds up to 20 feet thick. An outcrop approximately 2,000 feet northwest of the site has a strike of N60°E and dips to the northeast at approximately 12 degrees.

E. GROUNDWATER

On March 1, 1982, the Division of Hazard Management, Department of Environmental Protection, collected water samples from each of the private residential wells near the Krysowaty dump site. The samples were analyzed by Stablex - Reutter Incorporated for the complete priority pollutant protocol (purgeable organic compounds, base neutral extractable organics, acid extractable organics, pesticidal compounds, polychlorinated biphenyls, and inorganic parameters). Results of the analysis indicated that the water from these wells was actually very

clean. This was much the same as an earlier composite sampling of the private wells in January 1982, tested by Mead Compu Chem.

The Township of Hillsborough retained Betz-Converse-Murdoch, Incorporated, consulting engineers to identify the extent and severity of ground and surface water contamination. Their investigation concluded that:

1. Hazardous chemical wastes, including benzidine, benzene, hexachlorobenzene and other known or suspected carcinogens are buried at the site;
2. Hazardous waste constituents, including known or suspected carcinogens, are being released from the disposal site;
3. Groundwater and surfacewater quality is being degraded by hazardous waste constituents;
4. A plume of contaminated groundwater is travelling in rock fractures in a generally north-to-northeast direction toward residences along Three Bridges Road. These residences rely on individual wells for potable water;
5. Heavy metals are present in the residential well water samples obtained by NJDEP and the presence of organic compounds is suspected;
6. For some of the compounds found, no safe level (or extremely low levels) of exposure in drinking water exists;
7. Analytical test limits of detection for some of the compounds are approximately three orders of magnitude higher than the USEPA recommended safe drinking water concentration levels.

II. HEALTH EFFECTS STUDY

The Environmental Health Program conducted an epidemiologic study of residents living near the Krysowaty Farm site, in response to complaints of health problems and at the request of the Hillsborough Township Health Department. The June 1982 survey consisted of a questionnaire administered to each member of the twelve (12) households in the vicinity of the site to gather information on exposure to toxic substances, the presence of symptoms and reported medical problems. In addition, this questionnaire was administered to a control group of residents living several miles from the fill. The information was analyzed to determine whether health symptoms were more prevalent among residents living near Krysowaty Farm.

A. SUBJECTS AND METHODS

The data for the present analysis are from a cross-sectional health study of the population (the exposed group) residing in the vicinity of the Krysowaty Farm Abandoned Disposal Site and consuming well

water, and another population (the unexposed group) of similar housing and socio-economic status residing in another part of Hillsborough Township but on a municipal water supply. No contamination had been found in this supply, according to NJDEP sampling results prior to the survey presented here. A map of the survey areas is shown on page 16. The health data from both groups were collected using a standardized environmental health effects questionnaire (See Appendix A).

The analyses of relative risks were done separately by sex. This was done because it was felt that degree of exposure might differ for men and women.

B. RESULTS

The sample sizes; the proportion of households successfully interviewed; the distributions of the population by sex, age, tobacco use, chemical exposure and perception of taste of the water are shown in Table I. There was a much lower response rate, proportionally fewer females and fewer persons aged 10-19 in the unexposed group than in the exposed group. There were proportionally more young children (age 0-9) in the unexposed area. The unexposed group complained more often about the taste of their water, but the difference was not statistically significant ($X^2 = 1.1$, $p > 0.05$).

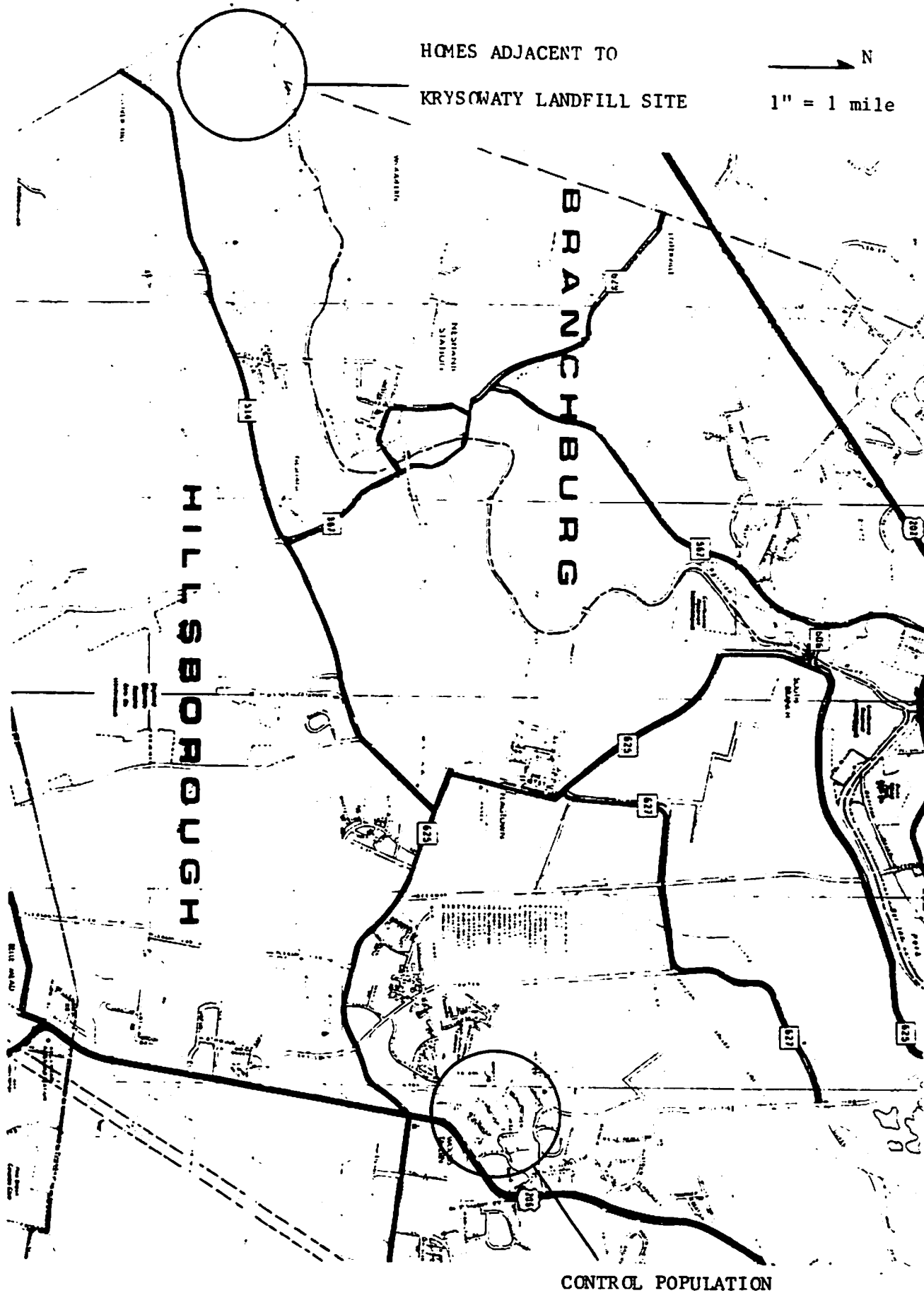
The data presented in Table II are age- and sex-adjusted relative risks of complaints among the exposed population compared to complaints among the unexposed population. A relative risk greater than one (1) indicates that the risk of the specific symptom is greater in the exposed population. An asterisk (*) by a relative risk indicates that the chi square was significant ($p < 0.05$) and that the 95% confidence interval does not include one (See Appendix B). People living near the landfill reported more symptoms, and females reported all symptoms more often, than the unexposed population. Statistically significant relative risks, however, were found for tiredness in females only and in the male-female summary.

Medical problems are described in Table III. No appreciable differences were reported for medical conditions. Some conditions were more prevalent in the exposed group and some in the controls. The small sample sizes prevent any meaningful analysis of these differences. The relative risk of medical problems among females was 1.8 (95% confidence limits of 0.4 and 8.4) and among males was 2.9 (0.3, 31.9). The confidence intervals include one indicating that no statistically significant excess was found by sex.

Pregnancy problems are presented in Table IV. Nine women living in the study area near Krysovaty Farm responded to the question of pregnancy problems compared to eighteen women from the control group. The totals in Table IV refer to the total number of women having pregnancy problems, not to the total number of problems. In the exposed group, two of the nine respondents reported having had pregnancy problems. Of the four problems reported, three of them were miscarriages with one woman reporting two miscarriages since moving to the study area. The other respondent reported one miscarriage and difficulty conceiving during the 1950's, which was prior to the chemical dumping in the late 1960's.

FIGURE 2

MAP OF HILLSBOROUGH TOWNSHIP WITH THE EXPOSED AND UNEXPOSED STUDY AREAS NOTED



C. DISCUSSION

The exposed and unexposed groups may not be entirely comparable, because of the poor response rate among the latter. If only sick persons responded in the unexposed group, the data here would be biased toward no difference between the groups. Despite this potential bias, the population living near Krysovaty Farm reported more symptoms than the unexposed population, although only tiredness among exposed females was statistically increased. The levels of heavy metals found (in the water of only a few homes), however, would not be expected to cause the symptoms reported. No other substances were found in the water. Increased concern or stress of living near a known hazardous waste site may contribute to either an increased reporting of symptoms or an increased number of symptoms among the supposedly exposed group as compared to the unexposed group. The effect of any such stress in this study group may have been minimized by the 50% response rate of respondents considered "unexposed". Sick individuals in the "unexposed group" may have been more likely to respond and artifactually raise the percentage of symptoms in the "unexposed group." This factor in conjunction with the small sample size may be the reason for the lack of statistically significant associations found in this study. It is likely, however, that any levels of exposure to the population were very low and were not etiologically important to the reported health complaints and problems found.

D. RECOMMENDATION

Because of the presence of abandoned chemicals at Krysovaty a sample of the wells should be periodically reanalyzed for contaminants to assure the absence of hazardous substances in the drinking water.

TABLE I

KRYSO WATY STUDY
DISTRIBUTION OF POPULATION SURVEYED

		Exposed Population		Unexposed Population	
Total Sample Size of Households		12		30	
Respondents households-		12	(100%)	15	(50%)
Sex					
Male-		14	(44%)	21	(49%)
Female-		18	(56%)	22	(51%)
Total Respondents-		32	(100%)	43	(100%)
Age					
0-9		2	(6%)	9	(21%)
10-19		4	(12%)	2	(5%)
20-59		21	(66%)	25	(58%)
60+		5	(16%)	7	(16%)
Total Respondents-		32	(100%)	43	(100%)
Tobacco use and/or Chemical Exposure					
Yes-		17	(53%)	23	(53%)
No-		15	(47%)	20	(47%)
Total Respondents-		32	(100%)	43	(100%)
Bothered by Taste of Water					
Yes-		4	(13%)	14	(33%)
No-		28	(87%)	29	(67%)
Total Respondents-		32	(100%)	43	(100%)

TABLE II

KRYLOWATY STUDY
RELATIVE RISK OF REPORTED SYMPTOMATOLOGY
(ALL COMPARISONS ARE ADJUSTED FOR THE EFFECTS OF AGE AND SEX)

SEX	Frequency of Complaint	Eye Irritation	Nasal Irritation	Rash	Skin Irritation	Tiredness	Joint Pain	Muscle Pain	Nausea	Diarrhea	Loss of Appetite	Weight Loss	Abdominal Pain	other	Medical Problem	Pregnancy Problem
FEMALE	Bothered(a)	1.72	1.52	3.32	6.29	3.10	2.85	2.85	12.60	1.37	12.20		1.07	0		
	Frequently bothered(b)	5.39	1.96	0.80	0	4.95*	2.09			3.12		0	1.06	0		
	Saw Physician(c)	2.16	1.30	2.08	0	5.60*	2.02	1.04	10.20	2.56	1.24x		1.76	0	1.77	∞
MALE	Bothered	0.44	0.65	0.74	3.14	5.26	1.95	0.57	3.00	0	1.71		4.43	0.38		
	Frequently Bothered	0.29	1.70	0.73		5.40	1.74	0.73		0	0	0	0.73x	0		
	Saw Physician	0.24	0.86	0.84	0	1.05	1.74	0	3.00	0	1.71	0	2.71	0.50	2.87	
MALE & FEMALE	Bothered	1.28	1.67	0.67	0.61	4.93*	1.85	5.00		3.91		0	0.97	0		
	Frequently Bothered	1.28	1.67	0.67	0.61	4.93*	1.85	5.00		3.91		0	0.97	0		
	Saw Physician	0.08	1.03	1.35	0	2.96	1.73	0.48	7.01	0.60	1.44		1.96	0.41	2.08	

(a) Bothered = All levels of complaints (daily, weekly, monthly, seldom)

(b) Frequently Bothered = Frequent complaints (daily or weekly)

(c) Saw Physician = Saw physician for complaint

x = Crude rate

* = The 95% confidence interval does not include one, as shown in Appendix B.
Results when there are no controls with complaint

TABLE III
 REPORTED MEDICAL PROBLEMS FOR
 KRYSOWATY STUDY POPULATIONS

Medical Problem	Exposed (N=32)		Unexposed (N=43)	
	#	%	#	%
Hyper tension	2	6.2	1	2.3
"Back Problems"	-	-	2	4.7
Ear Problem	1	3.1	1	2.3
Arthritis	3	9.4	1	2.3
Diabetes	1	3.1	-	-
Heart Problem	4	12.5	4	9.3
Allergies	1	3.1	-	-
PKU Child	1	3.1	-	-
Asthma	-	-	1	2.3
"Bowel Problem"	1	3.1	1	2.3
CVA	-	-	1	2.3
Ulcers	1	3.1	1	2.3
Gallbladder Problem	-	-	1	2.3
Glaucoma	1	3.1	-	-
Knee Problem	-	-	1	2.3
Bursitis	-	-	1	2.3
Pleurisy	-	-	1	2.3
Thyroid Problem	-	-	2	4.7
Hypoglycemia	1	3.1	2	4.7
Gastritis	-	-	1	2.3
Breast Cancer	1	3.1	-	-
"Brain Mass"	1	3.1	-	-
Kidney Problem	1	3.1	-	-
"Disimmune Polyneuropathy"	1	3.1	-	-
Staph Infection	1	3.1	-	-

TABLE IV

REPORTED PREGNANCY PROBLEMS FOR
KRYLOWATY STUDY POPULATIONS

	Exposed Area Respondents (N=9)		Unexposed Area Respondents (N=8)	
	#	%	#	%
Miscarriage	2	22.2	-	-
Difficulty Conceiving	1	11.1	-	-
Total	2	22.2	-	-



State of New Jersey

DEPARTMENT OF HEALTH

JOHN FITCH PLAZA
CN 360, TRENTON, N.J. 08625

COMMISSIONER

CONSENT FORM

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, and health, as well as some information about other substances I may have been exposed to. The interview will require approximately 15 minutes 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 New Jersey State Department of Health to determine whether environmental factors in this area may be contributing to health problems.

Name (Print) _____

Participant Signature _____

Date: _____

Household
Number _____

Interviewer's
Name _____

Respondent's Name _____

Address _____

Mailing address if different _____

Now I want to ask you about all persons who live in this household.
(Interviewer to circle race of household here: White Non-white)

What are the names of all persons who live here?

What are the ages?

Does or did anyone smoke cigarettes regularly (at least once a day for a year or 20 packs in a lifetime)?

- (CODE 1 = Current Smoker
 2 = Ex smoker (quit more than 1 year ago.)
 3 = Non-smoker

Does anyone in this household have a regular exposure either at a job or hobby to chemicals?

- (Code 1 = At job 2 = Hobby 3 = None)

	<u>Name</u>	<u>Age</u>	<u>Sex</u>	<u>Smoking Status</u>	<u>Dust or Chemical Exposure</u>
Subject # 1	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____
4	_____	_____	_____	_____	_____
5	_____	_____	_____	_____	_____
6	_____	_____	_____	_____	_____

What is the source of your water for showering, bathing and washing dishes?

(If water is from different sources check more than one box and indicate percentage for all sources and indicate year)

Private well	<input type="checkbox"/>	_____	Mo. ___ Yr. ___	to	Mo. ___ Yr. ___
Municipal water	<input type="checkbox"/>	_____	Mo. ___ Yr. ___	to	Mo. ___ Yr. ___
Bottled Water	<input type="checkbox"/>	_____	Mo. ___ Yr. ___	to	Mo. ___ Yr. ___
Other	<input type="checkbox"/>	_____	Mo. ___ Yr. ___	to	Mo. ___ Yr. ___

What is the source of the water you use for cooking and drinking?

(If water is from different sources check more than one box and indicate percentage for all sources and indicate year)

Private well	<input type="checkbox"/>	Mo. ___ Yr. ___	to	Mo. ___ Yr. ___
Municipal well	<input type="checkbox"/>	Mo. ___ Yr. ___	to	Mo. ___ Yr. ___
Bottled water	<input type="checkbox"/>	Mo. ___ Yr. ___	to	Mo. ___ Yr. ___
Other	<input type="checkbox"/>	Mo. ___ Yr. ___	to	Mo. ___ Yr. ___

Have you been informed that your water is contaminated? Yes ___ No ___

If yes, Date / /
 day Mo. Yr.

Are you bothered by any of the following:

If yes, to any of the below symptoms, ask: How frequently does these symptoms occur?

Code: 1 = Seldom
 2 = Monthly
 3 = Weekly
 4 = Daily

Have you been bothered by these symptoms?

			Frequency of Symptom	Seen by physician	
	Yes	No		Yes	No
Eye irritation (itchy, red or watery eyes)	_____	_____	_____	_____	_____
Nasal irritation (sneezing, runny nose or stuffiness)	_____	_____	_____	_____	_____
Skin rash	_____	_____	_____	_____	_____
Skin irritation (redness)	_____	_____	_____	_____	_____
Tiredness	_____	_____	_____	_____	_____
Pain in joints	_____	_____	_____	_____	_____
Pain in muscles	_____	_____	_____	_____	_____
Nausea	_____	_____	_____	_____	_____
Diarrhea	_____	_____	_____	_____	_____
Loss of appetite	_____	_____	_____	_____	_____
Loss of weight (without dieting)	_____	_____	_____	_____	_____
Stomach pain	_____	_____	_____	_____	_____
Other gastrointestinal problems (specify) _____	_____	_____	_____	_____	_____

Have you been told by a physician that you have a medical problem?
 Yes ___ No ___ If yes, name of physician and phone number.

If yes, describe condition and date of diagnosis.

For any women living in the house: Have you had trouble becoming pregnant or with a pregnancy? Yes ___ No ___

If yes, describe and list years.

Have you ever been bothered by the taste of water in this community? Yes ___ No ___

Household _____
Subject _____

Are you bothered by any of the following:

If yes, to any of the below symptoms, ask: How frequently does these symptoms occur?

Code: 1 = Seldom
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3 = Weekly
4 = Daily

Have you been bothered by these symptoms?

			Frequency of Symptom	Seen by physician	
	Yes	No		Yes	No
Eye irritation (itchy, red or watery eyes)	---	---	_____	---	---
Nasal irritation (sneezing, runny nose or stiffness)	---	---	_____	---	---
Skin rash	---	---	_____	---	---
Skin irritation (redness)	---	---	_____	---	---
Tiredness	---	---	_____	---	---
Pain in joints	---	---	_____	---	---
Pain in muscles	---	---	_____	---	---
Nausea	---	---	_____	---	---
Diarrhea	---	---	_____	---	---
Loss of appetite	---	---	_____	---	---
Loss of weight (without dieting)	---	---	_____	---	---
Stomach pain	---	---	_____	---	---
Other gastrointestinal problems (specify) _____	---	---	_____	---	---

Have you been told by a physician that you have a medical problem?
Yes ___ No ___ If yes, name of physician and phone number.

If yes, describe condition and date of diagnosis.

For any women living in the house: Have you had trouble becoming pregnant or with a pregnancy? Yes ___ No ___

If yes, describe and list years.

Have you ever been bothered by the taste of water in this community? Yes ___ No ___

Are you bothered by any of the following:

If yes, to any of the below symptoms, ask: How frequently does these symptoms occur?

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 2 = Monthly
 3 = Weekly
 4 = Daily

Have you been bothered by these symptoms?

			Frequency of Symptom	Seen by physician	
	Yes	No		Yes	No
Eye irritation (itchy, red or watery eyes)	_____	_____	_____	_____	_____
Nasal irritation (sneezing, runny nose or stuffness)	_____	_____	_____	_____	_____
Skin rash	_____	_____	_____	_____	_____
Skin irritation (redness)	_____	_____	_____	_____	_____
Tiredness	_____	_____	_____	_____	_____
Pain in joints	_____	_____	_____	_____	_____
Pain in muscles	_____	_____	_____	_____	_____
Nausea	_____	_____	_____	_____	_____
Diarrhea	_____	_____	_____	_____	_____
Loss of appetite	_____	_____	_____	_____	_____
Loss of weight (without dieting)	_____	_____	_____	_____	_____
Stomach pain	_____	_____	_____	_____	_____
Other gastrointestinal problems (specify) _____	_____	_____	_____	_____	_____

Have you been told by a physician that you have a medical problem?
 Yes ___ No ___ If yes, name of physician and phone number.

If yes, describe condition and date of diagnosis.

For any women living in the house: Have you had trouble becoming pregnant or with a pregnancy? Yes ___ No ___

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			Frequency of Symptom	Seen by physician	
	Yes	No		Yes	No
Eye irritation (itchy, red or watery eyes)	_____	_____	_____	_____	_____
Nasal irritation (sneezing, runny nose or stuffiness)	_____	_____	_____	_____	_____
Skin rash	_____	_____	_____	_____	_____
Skin irritation (redness)	_____	_____	_____	_____	_____
Tiredness	_____	_____	_____	_____	_____
Pain in joints	_____	_____	_____	_____	_____
Pain in muscles	_____	_____	_____	_____	_____
Nausea	_____	_____	_____	_____	_____
Diarrhea	_____	_____	_____	_____	_____
Loss of appetite	_____	_____	_____	_____	_____
Loss of weight (without dieting)	_____	_____	_____	_____	_____
Stomach pain	_____	_____	_____	_____	_____
Other gastrointestinal problems (specify) _____	_____	_____	_____	_____	_____

Have you been told by a physician that you have a medical problem?
 Yes ___ No ___ If yes, name of physician and phone number.

If yes, describe condition and date of diagnosis.

For any women living in the house: Have you had trouble becoming pregnant or with a pregnancy? Yes ___ No ___

• If yes, describe and list years.

Have you ever been bothered by the taste of water in this community? Yes ___ No ___

Are you bothered by any of the following:

If yes, to any of the below symptoms, ask: How frequently does these symptoms occur?

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Have you been bothered by these symptoms?

			Frequency of Symptom	Seen by physician	
	Yes	No		Yes	No
Eye irritation (itchy, red or watery eyes)	___	___	_____	___	___
Nasal irritation (sneezing, runny nose or stuffness)	___	___	_____	___	___
Skin rash	___	___	_____	___	___
Skin irritation (redness)	___	___	_____	___	___
Tiredness	___	___	_____	___	___
Pain in joints	___	___	_____	___	___
Pain in muscles	___	___	_____	___	___
Nausea	___	___	_____	___	___
Diarrhea	___	___	_____	___	___
Loss of appetite	___	___	_____	___	___
Loss of weight (without dieting)	___	___	_____	___	___
Stomach pain	___	___	_____	___	___
Other gastrointestinal problems (specify) _____	___	___	_____	___	___

Have you been told by a physician that you have a medical problem?
 Yes ___ No ___ If yes, name of physician and phone number.

If yes, describe condition and date of diagnosis.

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If yes, describe and list years.

Have you ever been bothered by the taste of water in this community? Yes ___ No ___

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Have you been bothered by these symptoms?

			Frequency of Symptom	Seen by physician	
	Yes	No		Yes	No
Eye irritation (itchy, red or watery eyes)	___	___	_____	___	___
Nasal irritation (sneezing, runny nose or stuffness)	___	___	_____	___	___
Skin rash	___	___	_____	___	___
Skin irritation (redness)	___	___	_____	___	___
Tiredness	___	___	_____	___	___
Pain in joints	___	___	_____	___	___
Pain in muscles	___	___	_____	___	___
Nausea	___	___	_____	___	___
Diarrhea	___	___	_____	___	___
Loss of appetite	___	___	_____	___	___
Loss of weight (without dieting)	___	___	_____	___	___
Stomach pain	___	___	_____	___	___
Other gastrointestinal problems (specify) _____	___	___	_____	___	___

Have you been told by a physician that you have a medical problem?
 Yes ___ No ___ If yes, name of physician and phone number.

If yes, describe condition and date of diagnosis.

For any women living in the house: Have you had trouble becoming pregnant or with a pregnancy? Yes ___ No ___

If yes, describe and list years.

Have you ever been bothered by the taste of water in this community? Yes ___ No ___

These 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 to reach you?

Phone _____

Best Time _____ AM
PM

Time Ended _____ AM
PM

KRYSOATY STUDYAPPENDIX BEYE IRRITATION

SEX	FREQUENCY OF COMPLAINTS	Exposed		Unexposed		RELATIVE RISK	95% CONFIDENCE LIMITS
		#	%	#	%		
FEMALE	Bothered	9	50	6	27	1.72	0.53, 5.53
	Freq. Bothered	4	22	1	5	5.39	0.59, 49.36
	Saw Physician	4	22	3	14	2.16	0.32, 14.46
MALE	Bothered	3	21	8	38	0.44	0.05, 3.61
	Freq. Bothered	1	7	4	19	0.29	0.01, 8.00
	Saw Physician	1	7	5	24	0.24	0.01, 5.53
MALE and FEMALE	Bothered	12	38	14	33	1.24 ^x	
	Freq. Bothered	5	16	5	12	1.28	0.32, 5.13
	Saw Physician	5	16	8	19	0.08	0.01, 0.50

x = crude rate

KRYSOWATY STUDYAPPENDIX BNASAL IRRITATION

SEX	FREQUENCY OF COMPLAINTS	Exposed		Unexposed		RELATIVE RISK	95% CONFIDENCE LIMITS	
		#	%	#	%			
FEMALE	Bothered	7	39	7	32	1.52	0.32, 7.18	
	Freq. Bothered	4	22	3	14	1.96	0.34, 11.14	
	Saw Physician	4	22	3	14	1.30	0.25, 6.82	
MALE	Bothered	4	29	8	38	0.65	0.09, 4.80	
	Freq. Bothered	3	21	3	14	1.70	0.16, 17.73	
	Saw Physician	2	14	4	19	0.86	0.04, 17.90	
MALE and FEMALE	Bothered	11	34	15	35	0.83	0.29, 2.36	
	Freq. Bothered	7	22	6	14	1.67	0.47, 5.95	
	Saw Physician	6	19	7	16	1.03	0.29, 3.67	

KRYSOWATY STUDY

APPENDIX B

SKIN IRRITATION

SEX	FREQUENCY OF COMPLAINTS	Exposed		Unexposed		RELATIVE RISK	95% CONFIDENCE LIMITS
		#	%	#	%		
FEMALE	Bothered	3	17	2	9	6.29	0.58, 68.00
	Freq. Bothered	0	-	2	9	0	
	Saw Physician	0	-	1	5	0	
MALE	Bothered	2	14	1	5	3.14	0.05, 180.40
	Freq. Bothered	1	7	0	-		
	Saw Physician	0	-	1	5	0	
MALE and FEMALE	Bothered	5	16	3	7	2.42	0.51, 11.40
	Freq. Bothered	1	3	2	5	0.61	0.05, 7.35
	Saw Physician	0	-	2	5	0	

KRYSOWATY STUDY

APPENDIX B

TIREDDNESS

SEX	FREQUENCY OF COMPLAINTS	Exposed		Unexposed		RELATIVE RISK	95% CONFIDENCE LIMITS
		#	%	#	%		
FEMALE	Bothered	11	61	6	27	3.10	0.79, 12.14
	Freq. Bothered	11	61	4	18	4.95 ^a	1.25, 19.63
	Saw Physician	7	39	1	5	5.60 ^b	1.05, 29.88
MALE	Bothered	6	43	3	14	5.26	0.57, 48.90
	Freq. Bothered	5	36	2	10	5.40	0.49, 59.83
	Saw Physician	2	14	3	14	1.05	0.05, 19.56
MALE and FEMALE	Bothered	17	53	8	19	3.62 ^c	1.30, 10.03
	Freq. Bothered	16	50	6	14	4.93 ^d	1.71, 14.19
	Saw Physician	9	28	4	9	2.96	0.84, 10.43

^aChi Square = 2.27, p = 0.02 (two-tailed)

^bChi Square = 2.02, p = 0.04 (two-tailed)

^cChi Square = 2.47, p = 0.01 (two-tailed)

^dChi Square = 2.96, p = 0.004 (two-tailed)

KRYSOWATY STUDY

APPENDIX B

JOINT PAIN

SEX	FREQUENCY OF COMPLAINTS	Exposed		Unexposed		RELATIVE RISK	95% CONFIDENCE LIMITS
		#	%	#	%		
FEMALE	Bothered	7	39	3	14	2.85	0.64, 12.62
	Freq. Bothered	4	22	2	9	2.09	0.37, 11.85
	Saw Physician	4	22	2	9	2.02	0.39, 10.45
MALE	Bothered	4	29	4	19	1.95	0.19, 20.44
	Freq. Bothered	3	21	3	14	1.74	0.13, 23.51
	Saw Physician	3	21	3	14	1.74	0.13, 23.51
MALE and FEMALE	Bothered	11	34	7	16	2.25	0.74, 6.88
	Freq. Bothered	7	22	5	12	1.85	0.52, 6.64
	Saw Physician	7	22	5	12	1.73	0.52, 5.66

KRYSOWATY STUDYAPPENDIX BMUSCLE PAIN

SEX	FREQUENCY OF COMPLAINTS	Exposed		Unexposed		RELATIVE RISK	95% CONFIDENCE LIMITS
		#	%	#	%		
FEMALE	Bothered	6	33	3	14	2.85	0.46, 17.50
	Freq. Bothered	5	28	0	-		
	Saw Physician	2	11	2	9	1.04	0.17, 6.30
MALE	Bothered	2	14	5	24	0.57	0.06, 5.67
	Freq. Bothered	1	7	2	10	0.73	0.01, 16.30
	Saw Physician	0	-	3	14	0	
MALE and FEMALE	Bothered	8	25	8	19	1.23	0.38, 3.96
	Freq. Bothered	6	19	2	5	5.00	0.93, 26.63
	Saw Physician	2	6	5	12	0.48	0.09, 2.49

KRYSOATY STUDY

APPENDIX B

NAUSEA

SEX	FREQUENCY OF COMPLAINTS	Exposed		Unexposed		RELATIVE RISK	95% CONFIDENCE LIMITS
		#	%	#	%		
FEMALE	Bothered	5	28	1	5	12.60	0.80, 202.00
	Freq. Bothered	2	11	0	-		
	Saw Physician	4	22	1	5	10.20	0.59, 177.50
MALE	Bothered	1	7	1	5	3.00	0.01, 5539.70
	Freq. Bothered	1	7	0	-		
	Saw Physician	1	7	1	5	3.00	0.01, 5539.70
MALE and FEMALE	Bothered	6	19	2	5	8.01	0.96, 67.00
	Freq. Bothered	3	9	0	-		
	Saw Physician	5	16	2	5	7.01	0.83, 59.40

KRYSOWATY STUDYAPPENDIX BDIARRHEA

SEX	FREQUENCY OF COMPLAINTS	Exposed		Unexposed		RELATIVE RISK	95% CONFIDENCE LIMITS
		#	%	#	%		
FEMALE	Bothered	4	22	3	14	1.37	0.28, 6.70
	Freq. Bothered	3	17	1	5	3.12	0.41, 23.90
	Saw Physician	2	11	1	5	2.56	0.15, 44.50
MALE	Bothered	0	-	4	19	0	
	Freq. Bothered	0	-	0	-	0	
	Saw Physician	0	-	3	14	0	
MALE and FEMALE	Bothered	4	13	7	16	0.62	0.17, 2.30
	Freq. Bothered	3	9	1	2	3.91	0.45, 33.70
	Saw Physician	2	6	4	9	0.60	0.09, 4.02

KRYSOWATY STUDY

APPENDIX A

RASH

SEX	FREQUENCY OF COMPLAINTS	Exposed		Unexposed		RELATIVE RISK	95% CONFIDENCE LIMITS
		#	%	#	%		
		<hr/>					
FEMALE	Bothered	6	33	2	9	3.32	0.68, 16.20
	Freq. Bothered	1	6	1	5	0.80	0.04, 17.10
	Saw Physician	2	11	1	5	2.08	0.22, 20.10
<hr/>							
MALE	Bothered	2	14	4	19	0.74	0.04, 14.50
	Freq. Bothered	1	7	2	10	0.73	0.01, 16.30
	Saw Physician	1	7	2	10	0.84	0.01, 78.60
<hr/>							
MALE and	Bothered	8	25	6	14	1.66	0.49, 5.62
FEMALE	Freq. Bothered	2	6	3	7	0.67	0.09, 5.00
	Saw Physician	3	9	3	7	1.35	0.23, 8.00

KRYSOWATY STUDYAPPENDIX BLOSS OF APPETITE

SEX	FREQUENCY OF COMPLAINTS	Exposed		Unexposed		RELATIVE RISK	95% CONFIDENCE LIMITS	
		#	%	#	%			
FEMALE	Bothered	2	11	1	5	2.20	0.10,	48.40
	Freq. Bothered	2	11	0	-			
	Saw Physician	1	6	1	5	1.24	0.07,	21.90
MALE	Bothered	1	7	1	5	1.71	0.01,	370.00
	Freq. Bothered	0	-	0	-	0		
	Saw Physician	1	7	1	5	1.71	0.01,	370.00
MALE and FEMALE	Bothered	3	9	2	5	1.94	0.23,	16.50
	Freq. Bothered	2	6	0	-			
	Saw Physician	2	6	2	5	1.44	0.15,	13.50

KRYSOWATY STUDY

APPENDIX B

WEIGHT LOSS

SEX	FREQUENCY OF COMPLAINTS	Exposed		Unexposed		RELATIVE RISK	95% CONFIDENCE LIMITS
		#	%	#	%		
FEMALE	Bothered	1	6	0	-		
	Freq. Bothered	0	-	0	-	0	
	Saw Physician	1	6	0	-		
MALE	Bothered	1	7	0	-		
	Freq. Bothered	0	-	0	-	0	
	Saw Physician	0	-	0	-	0	
MALE and FEMALE	Bothered	2	6	0	-		
	Freq. Bothered	0	-	0	-	0	
	Saw Physician	1	3	0	-		

*None calculated.

KRYSOWATY STUDY

APPENDIX B

ABDOMINAL PAIN

SEX	FREQUENCY OF COMPLAINTS	Exposed		Unexposed		RELATIVE RISK	95% CONFIDENCE LIMITS
		#	%	#	%		
FEMALE	Bothered	3	17	3	14	1.07	0.16, 7.06
	Freq. Bothered	2	11	2	9	1.06	0.14, 8.20
	Saw Physician	3	17	2	9	1.76	0.22, 14.00
MALE	Bothered	3	21	2	10	4.43	0.14, 144.54
	Freq. Bothered	1	7	2	10	0.73	0.06, 9.18
	Saw Physician	2	14	2	10	2.71	0.03, 219.40
MALE and FEMALE	Bothered	6	19	5	12	1.79	0.44, 7.29
	Freq. Bothered	3	9	4	9	0.97	0.18, 5.19
	Saw Physician	5	16	4	9	1.96	0.41, 9.11

*None calculated.

OTHER

SEX	FREQUENCY OF COMPLAINTS	Exposed		Unexposed		RELATIVE RISK	95% CONFIDENCE LIMITS
		#	%	#	%		
		FEMALE	Bothered	0	-		
	Freq. Bothered	0	-	0	-	0	
	Saw Physician	0	-	0	-	0	
MALE	Bothered	1	7	4	19	0.38	0.02, 7.83
	Freq. Bothered	0	-	1	5	0	
	Saw Physician	1	7	3	14	0.50	0.02, 16.60
MALE and FEMALE	Bothered	1	3	4	9	0.31	0.04, 2.41
	Freq. Bothered	0	-	1	2	0	
	Saw Physician	1	3	3	7	0.41	0.04, 3.90

*None calculated.