Dover Township (Toms River) Childhood Cancer Investigation

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New Jersey Department of Health and Senior Services

June 2003

Response to Community Concerns

Ocean County's
OBSERVER
FRIDAY-SATURDAY, MARCH 22-23, 1996 TOMS RIVER, NEW JERSEY

Residents cry out for action

Testing at schools, cancer study slated

By RICHARD PETERSON
Staff Writer

TOMS RIVER — With but a few simple words, 17-year-old Michael Gillick opened last night's town meeting on Dover Township's cancer outbreak with a plea for help.

Four hours later, the last of the more than 1,000 people who crowded into the auditorium at Toms River High School North left with at least some idea of how government leaders plan to address the problem.

Officials from the federal, state and local levels,

See Cancer, Page A4

Peter F. Picknally Photo
Agnes Raimo holds her infant son, Ryan, at last night's meeting.

Anger, frustration explode at meeting

By MATT KALAFAT
Staff Writer

TOMS RIVER — Years of anger and heartache exploded last night onto a host of bewildered government officials, who for nearly two hours were silenced by volatile public outcry.

If not for Linda Gillick — perhaps the only person to have the respect of everyone in the Toms River High School North auditorium — federal, state, and local officials would probably still be waiting to talk.

New Jersey Health Commissioner Len Fishman didn't make it out of his opening remarks without

See Anger, Page A4

Dover Township Childhood Cancer Investigation
Public Health Response Plan

June 24, 1996

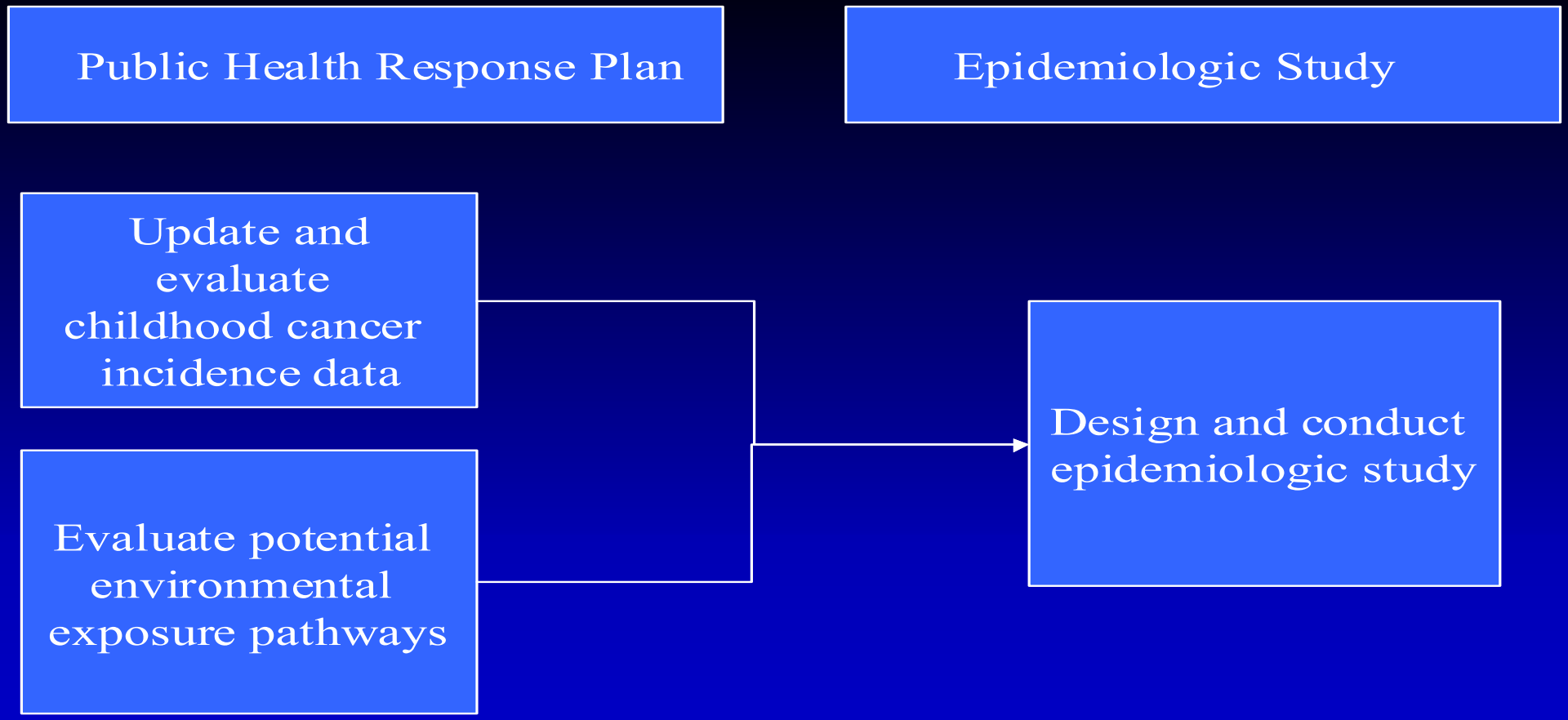
Prepared by:

New Jersey Department of Health and the
Agency for Toxic Substances and Disease Registry

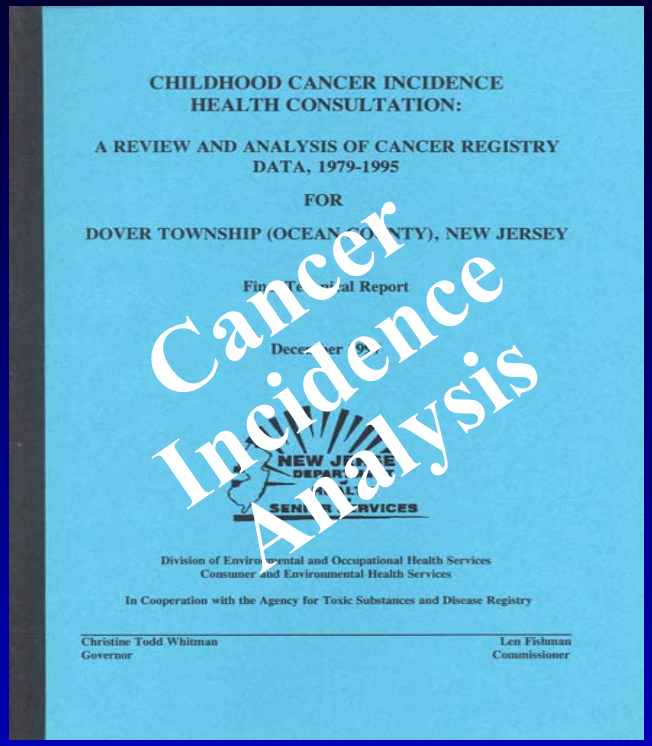
in coordination with the

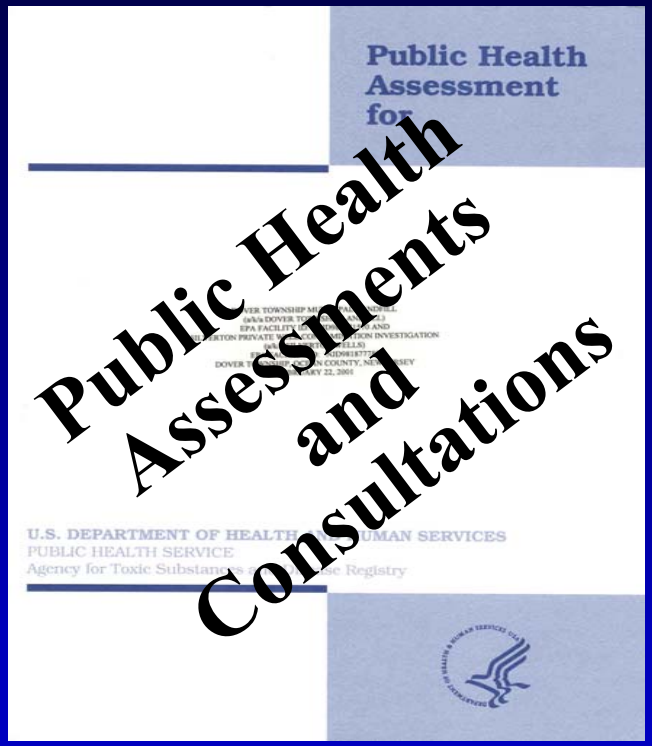
Citizens Action Committee on Childhood Cancer Cluster and the
Ocean County Health Department

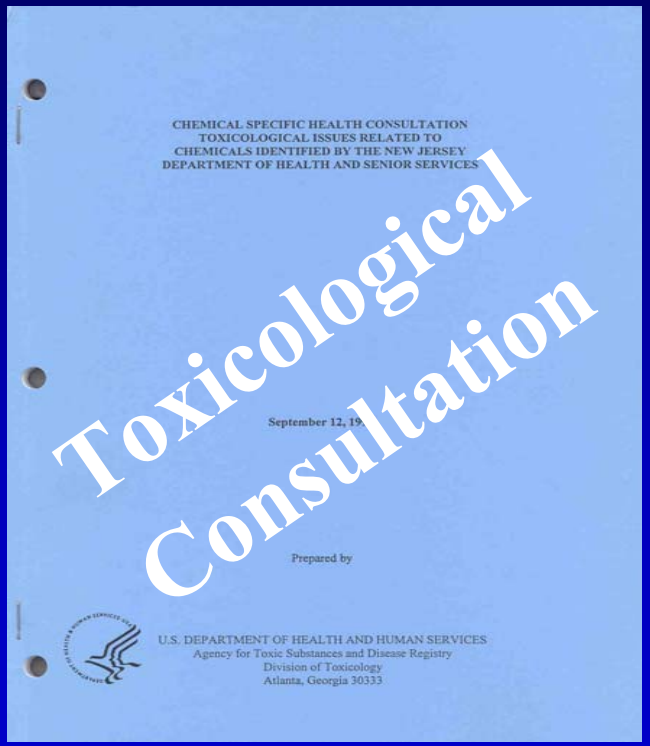
Process to Investigate Concerns About Cancer and the Environment



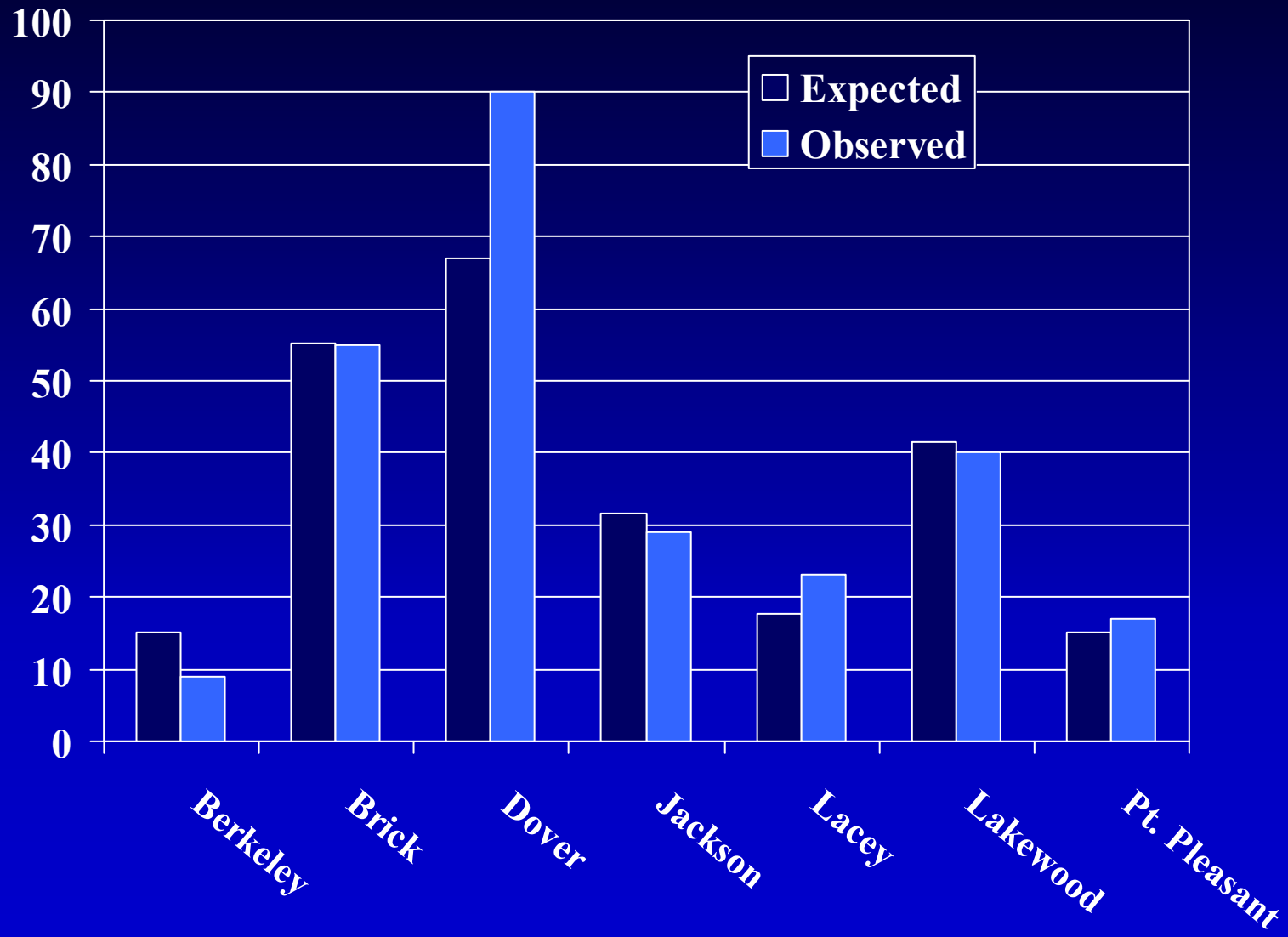
PHRP Reports



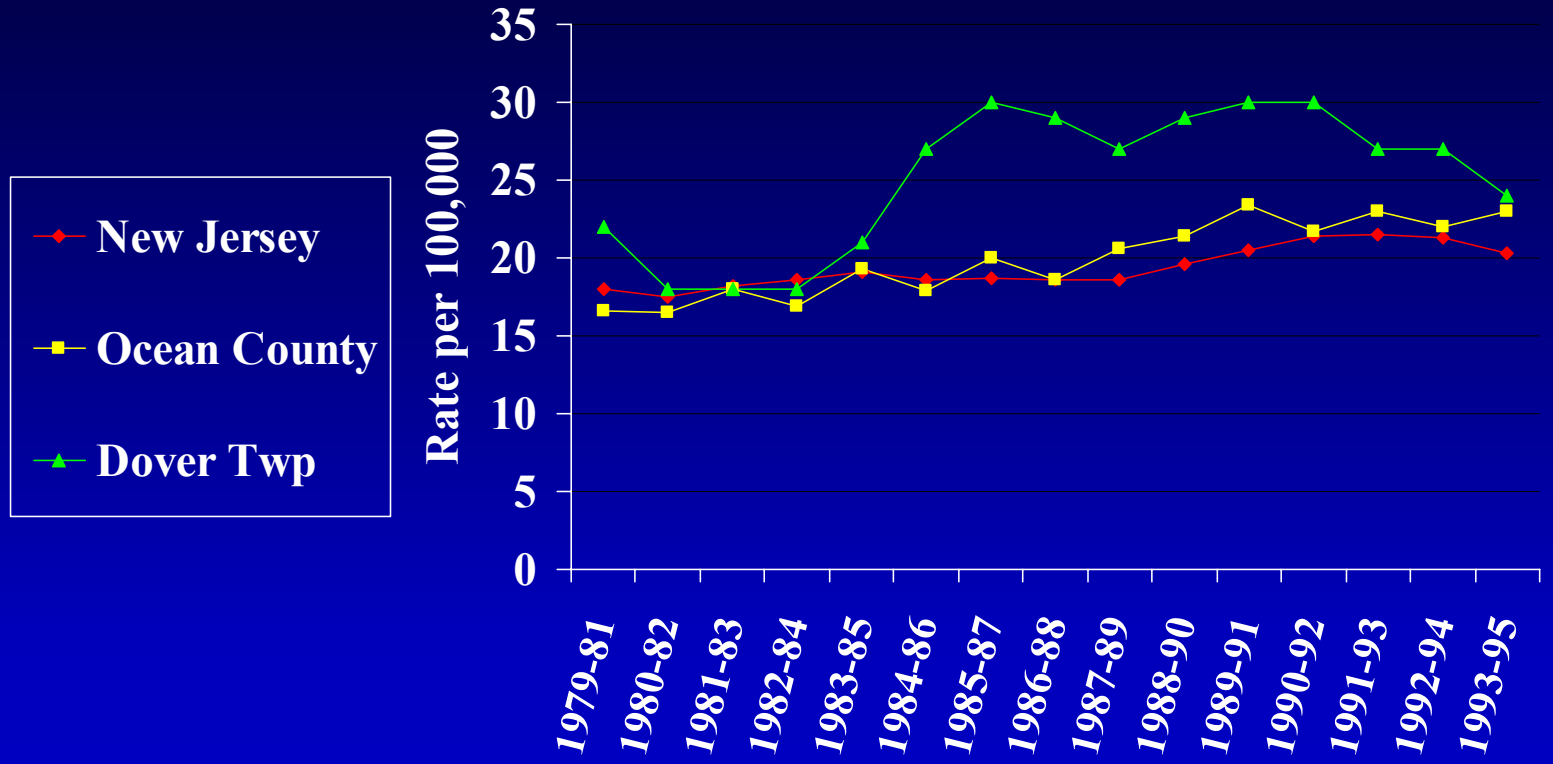




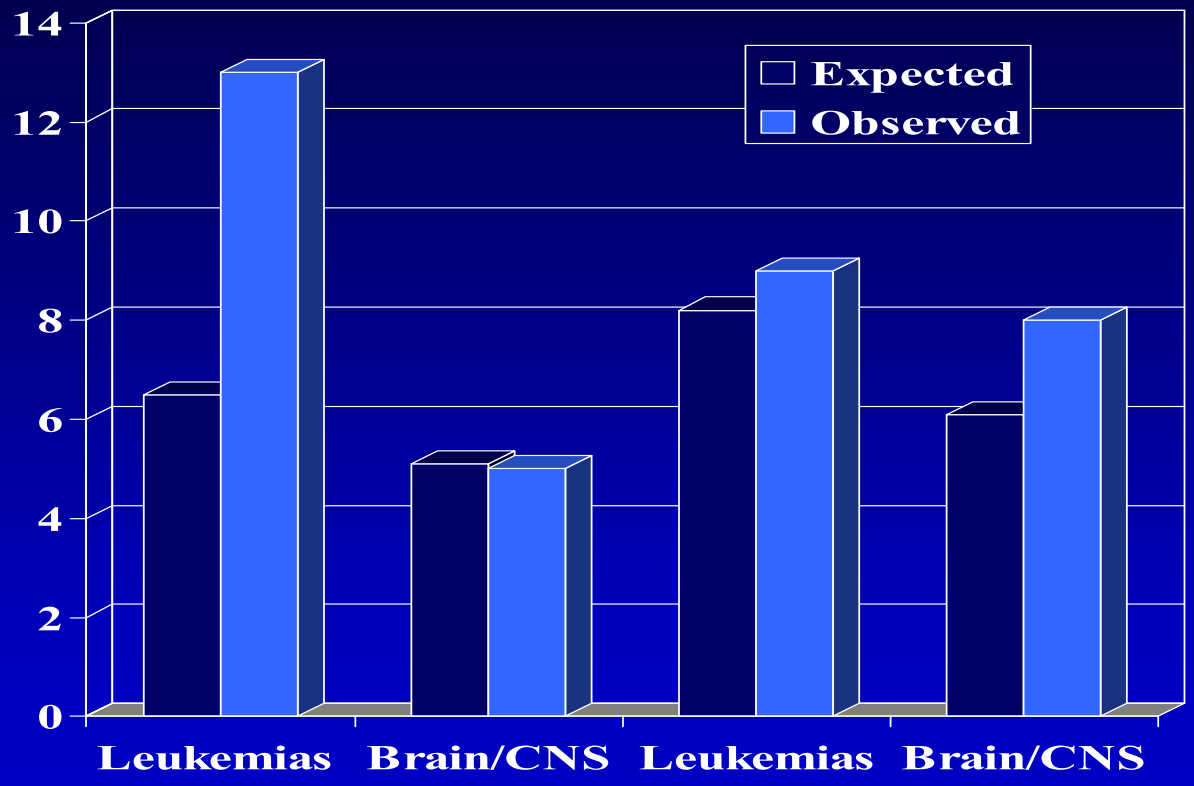
Childhood Cancer Incidence: Ocean County Towns, 1979-1995, Ages 0-19 Years



Time Trend in Childhood Cancer Rates 1979-1995

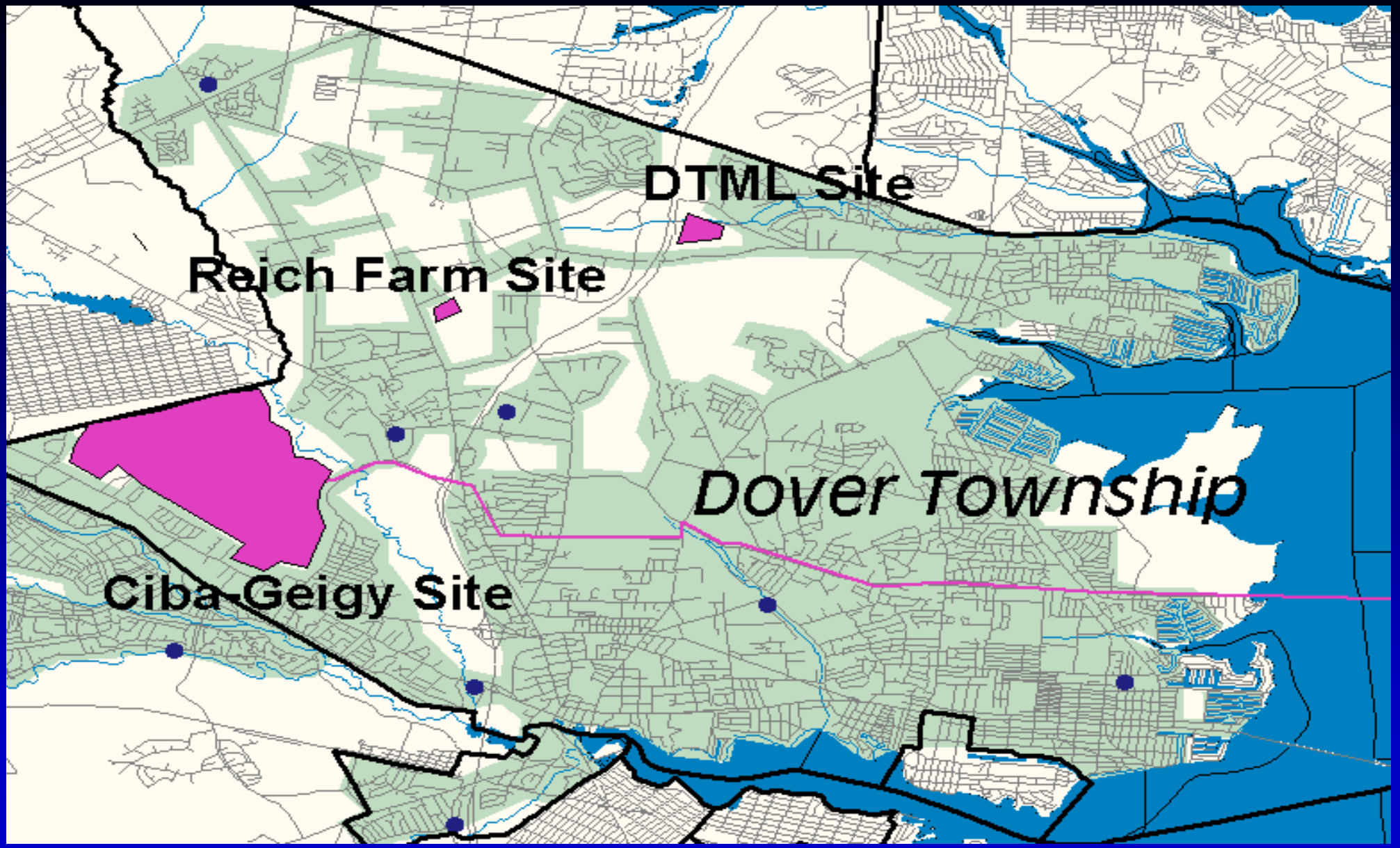


Childhood Cancer Incidence
Dover Township, 1979-1995, Ages 0-19 Years



Identified Environmental Exposures

- **Community water supply**
  - **Parkway wells impacted by Reich Farm beginning in early 1980s to 1996**
    - **Styrene-acrylonitrile trimer**
  - **Holly wells impacted by Ciba-Geigy in mid-1960s**
    - **Dyes and nitrobenzene**
- **Outdoor air**
  - **Air quality potentially impacted by emissions from the Ciba-Geigy plant**


DTML Site
Reich Farm Site
Dover Township
Ciba-Geigy Site

Initial Findings
Public Health Response Plan

- **Elevated childhood cancer incidence**
- **Past environmental exposures to unusual chemicals**
- **Epidemiologic study warranted**

Epidemiologic Study

- **Case-control design**
- **Interview Study**
  - **Leukemia and nervous system cancer**
  - **40 cases diagnosed 1979-1996 among Dover Twp. residents**
  - **159 controls matched on sex and year of birth**
  - **Data collection by structured interview**
- **Birth Records Study**

Study Questions Related to Environmental Exposure Pathways

- **Were case children more likely than control children to receive drinking water from any specific water source?**
  - **Specific interest in Parkway and Holly well fields during the time the water was most likely contaminated**
- **Were case children more likely than control children to be exposed to a specific air pollutant source?**

Other Risk Factors Under Study

- **Proximity to sites of concern**
- **Parental occupational exposures**
- **Demographic, pregnancy and birth characteristics**
- **Family medical history**
- **Health, medical conditions and medical procedures**
- **Diet and tap water consumption**
- **Tobacco smoke and alcohol use**
- **Household chemicals, animals, appliance use**

Approach to Exposure Assessment for Environmental Factors

- **Collect residence information**
- **Use computer models to reconstruct historic geographic pattern of environmental factors on a monthly basis, 1962-1996**
- **Match residence information with historic environmental models**

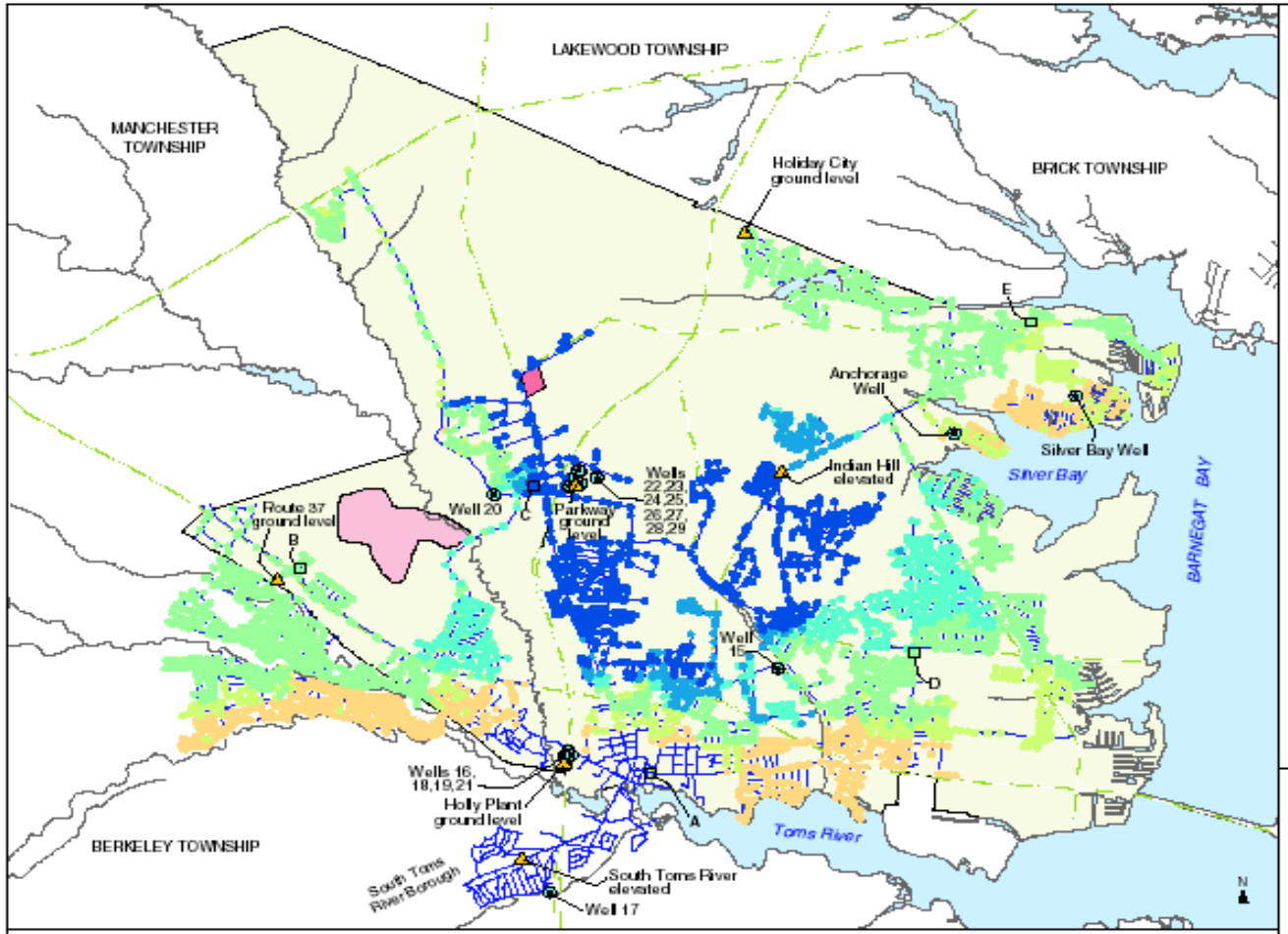
Water Distribution System Models

- **Reconstruct historic water flow within the community water system for each month 1962-1996**
- **Models estimate percent of water from each source at each study subject residence for each of 420 months**
- **Conducted by ATSDR**

Monthly Average Estimates for Parkway Well Water Distribution (June 1978)

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

PLATE 91



EXPLANATION

- Reich Farm NPL Site
- Ciba–Geigy NPL Site
- Dover Township
- Water body
- Water pipeline
- Major road
- Hydrography
- Municipal well
- Storage tank
- E — Pipeline location and letter. Percent contribution is reported in text

Percentage of water contributed by Parkway wells (22, 23, 24, 25, 26, 27, 28, 29), 24-hour average

- 1 to 10
- 10 to 25
- 25 to 50
- 50 to 75
- 75 to 90
- 90 to 100

Notes: (1) Water pipelines range in diameter from 2 inches to 16 inches
(2) Roads, hydrography, and boundaries based on 1995 TIGER/Line data
(3) Pipeline from water-utility database (Regal 1997)
(4) Percentage of water based on model reaching dynamic equilibrium after 1,200 hours of simulation time

0 0.5 1 1.5 2 MILES

PLATE 91. AREAL DISTRIBUTION OF SIMULATED PROPORTIONATE CONTRIBUTION OF WATER FROM THE PARKWAY WELLS (22, 23, 24, 25, 26, 27, 28, 29) TO LOCATIONS IN THE DOVER TOWNSHIP AREA, NEW JERSEY, JUNE 1978 CONDITIONS

By Morris L. Maslia, Jason B. Sautner, Mustafa M. Aral, Richard E. Gillig, Juan J. Reyes, and Robert C. Williams

ATSDR

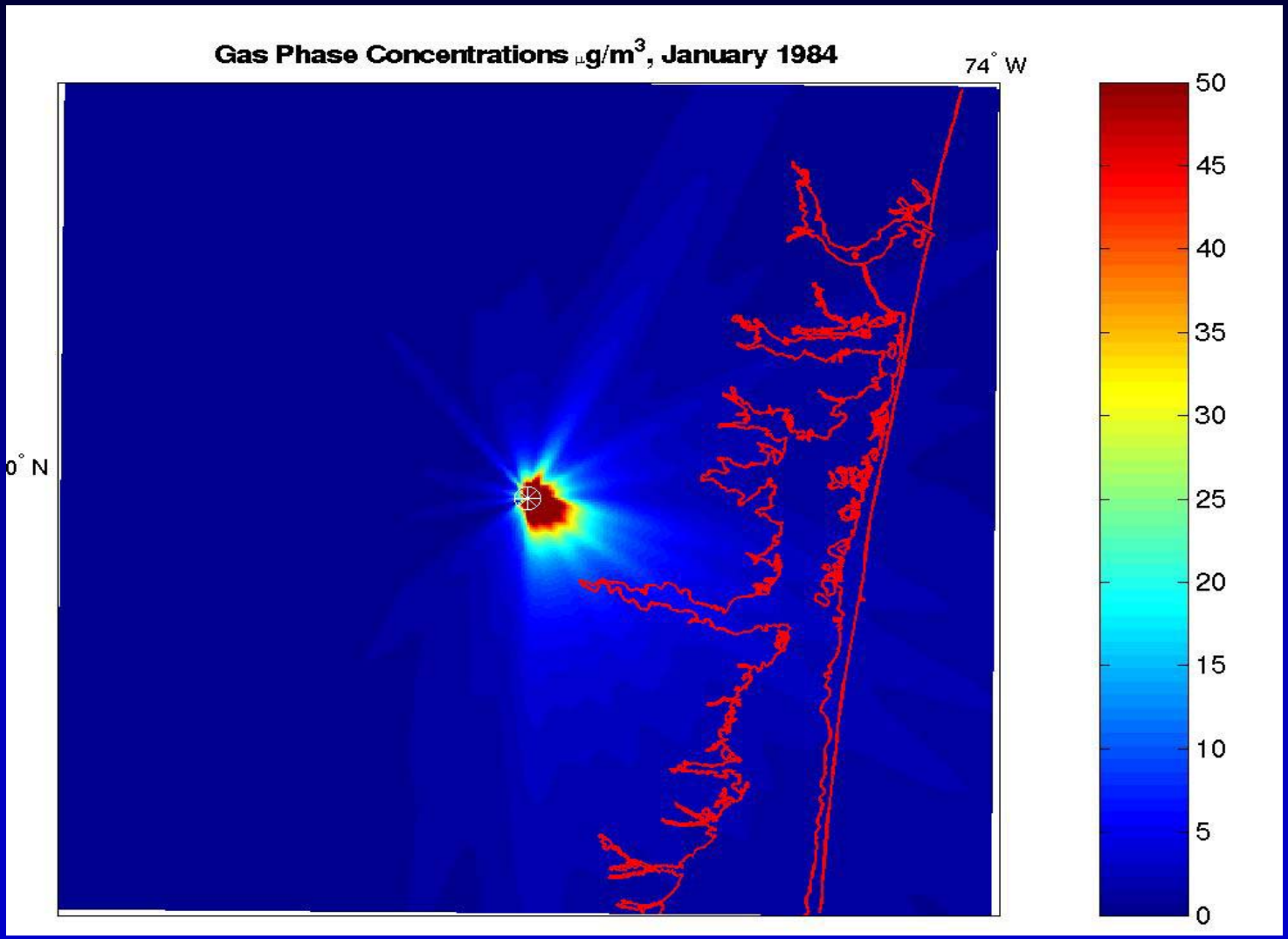
Dover Township Area, New Jersey
Water-Distribution System Model
Historical Reconstruction Analysis

Maslia ML, Sautner JB, Aral MM, Gillig RE, Reyes JJ, Williams RC. 2001. Historical reconstruction of the water-distribution system serving the Dover Township area, New Jersey: January 1962–December 1996. Atlanta: Agency for Toxic Substances and Disease Registry.

Air Pollutant Dispersion Models

- **Simulate historic air pollutant dispersion:**
  - **Ciba-Geigy Corporation site (1962-1996)**
  - **Oyster Creek Nuclear Generating Station (1970-1996)**
- **Models estimate average potential for exposure to air pollutants at each study subject residence for each month**
- **Conducted by EOHSI**

Monthly Average Estimates for Ciba-Geigy Emissions (January 1984)



Interview Study Exposure Indices

- For each subject, compute average value of environmental factor for specific life periods:
  - total time, pregnancy, postnatal
- Additional exposure indices incorporating reported tap water consumption
- Time-specific indices for Parkway and Holly well fields

Water Source Exposure Data for Hypothetical Subject

Subject Identifier	Calendar Month	Life Month	Water Source A %	Water Source B %	Residence Location
1234	03 76	-12	18	82	X1,Y1
1234	04 76	-11	24	76	X1,Y1
1234	05 76	-10	37	63	X1,Y1
1234	06 76	-9	58	42	X1,Y1
1234	07 76	-8	72	28	X1,Y1
1234	08 76	-7	66	34	X1,Y1
1234	09 76	-6	59	41	X1,Y1
1234	10 76	-5	8	92	X2,Y2
1234	11 76	-4	13	87	X2,Y2
1234	12 76	-3	0	100	X2,Y2
1234	01 77	-2	0	100	X2,Y2
1234	02 77	-1	6	94	X2,Y2
1234	03 77	0	98	2	X3,Y3
1234	04 77	1	96	4	X3,Y3
1234	05 77	2	90	10	X3,Y3
:	:	:	:	:	:
1234	10 84	103	92	8	X3,Y3

Drinking Water from Parkway Well Field

- **No associations for modeled exposure to Parkway well water over entire time frame**
- **Association found for modeled exposure to Parkway well water (1982-1996) during pregnancy for females with leukemia**

Leukemia (Age 0-19) and Prenatal Exposure to Parkway Water (1982-1996)

Group	*Water Source Index*	*Cases/ Controls*	*Odds Ratio (95% Confidence Interval)*
Males	<10%	9/31	--
	10-<50%	0/2	0.0
	50%+	0/3	0.0
Females	<10%	8/39	--
	10-<50%	1/7	0.8 (0.1-8.8)
	50%+	4/5	5.0 (0.8-31)

Leukemia (Age 0-19) and Prenatal Exposure to Parkway Water (1982-1996)

Group	*Source/ Consump -tion Index*	*Cases/ Controls*	*Odds Ratio (95% Confidence Interval)*
Males	Low	9/31	--
	Medium	0/0	0.0
	High	0/3	0.0
Females	Low	8/39	--
	Medium	0/9	0 (--)
	High	5/3	6.0 (1.1-32)

Drinking Water from Other Community Sources

- **No association for modeled exposure to Holly Street well water or Holly water before 1976**
- **No association observed for any of the eight other well fields ever serving the system**

Air Emissions

- **Association found for modeled exposure to Ciba-Geigy air emissions during pregnancy for females (under age 5) with leukemia**
- **No associations found for modeled exposure to Oyster Creek**

Leukemia (Age 0 - 4) and Prenatal Exposure to Ciba-Geigy Air Emissions

Group	*Exposure Level*	*Cases/ Controls*	*Odds Ratio (95% Confidence Interval)*
Males	Low	2/2	--
	Medium	0/2	0.0
	High	0/4	0.0
Females	Low	2/18	--
	Medium	3/8	5.2 (0.5-56)
	High	2/1	19 (0.9-400)

Summary of Findings Related to Primary Environmental Factors

- **Two environmental factors of primary interest were found to be associated with leukemia in female children, specifically for the prenatal exposure time period**
  - **Parkway well water (1982-1996)**
  - **Ciba-Geigy air emissions**
- **Associations not found in males**

Summary of Findings Related to Primary Environmental Factors, continued

- **No environmental risk factor of primary interest was associated with brain and central nervous system cancer**
- **No exposure to an environmental risk factor of primary interest during the postnatal exposure period was associated with any cancers**

Recommendations

- **NJDHSS should continue tracking of childhood cancer in Dover Township**
- **Efforts should be continued to reduce or interrupt environmental exposures**
- **ATSDR and NJDHSS should continue educational efforts on cancer and environmental health**

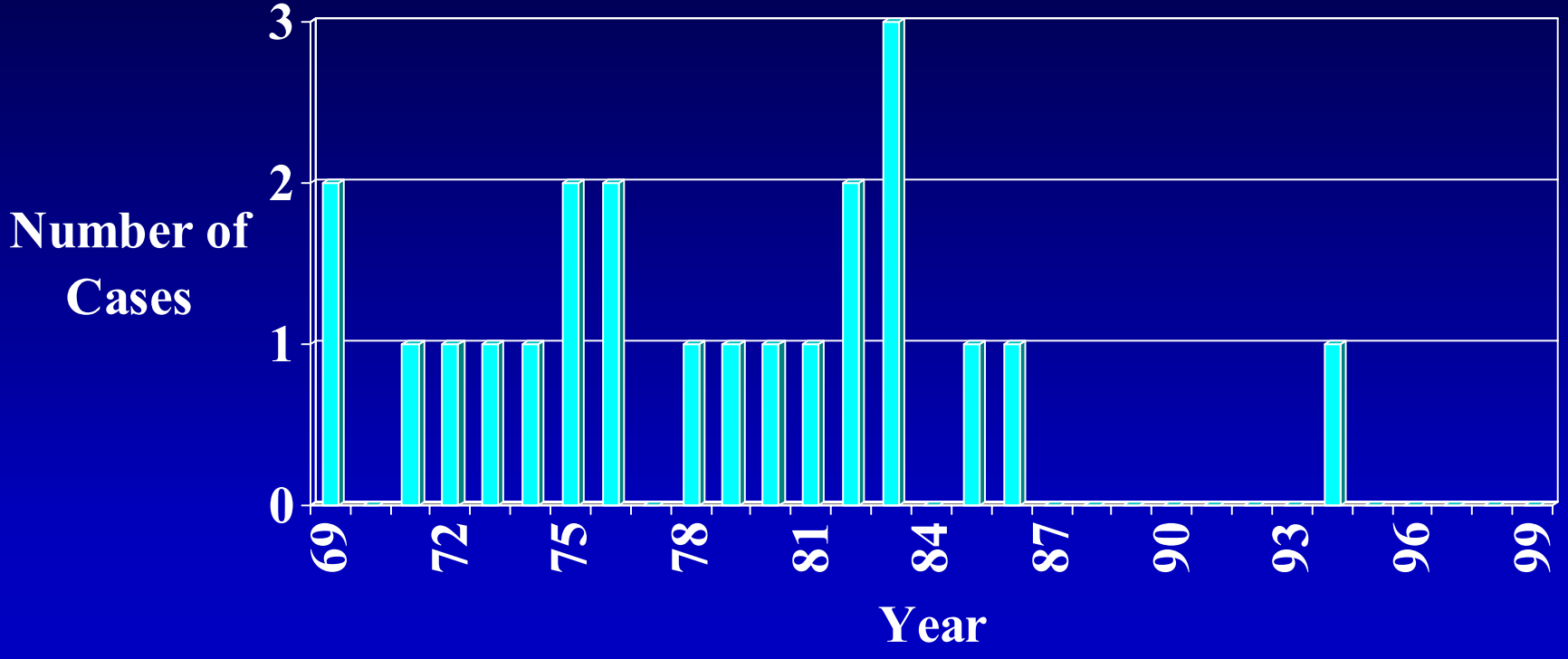
Cause and Effect?

- **Was the study designed and conducted properly? How accurate were exposure assessments?**
- **How strong is the statistical association?**
- **Is the association biologically plausible?**
- **Is the finding consistent with other studies?**
- **Do disease rates decline after exposures are reduced?**

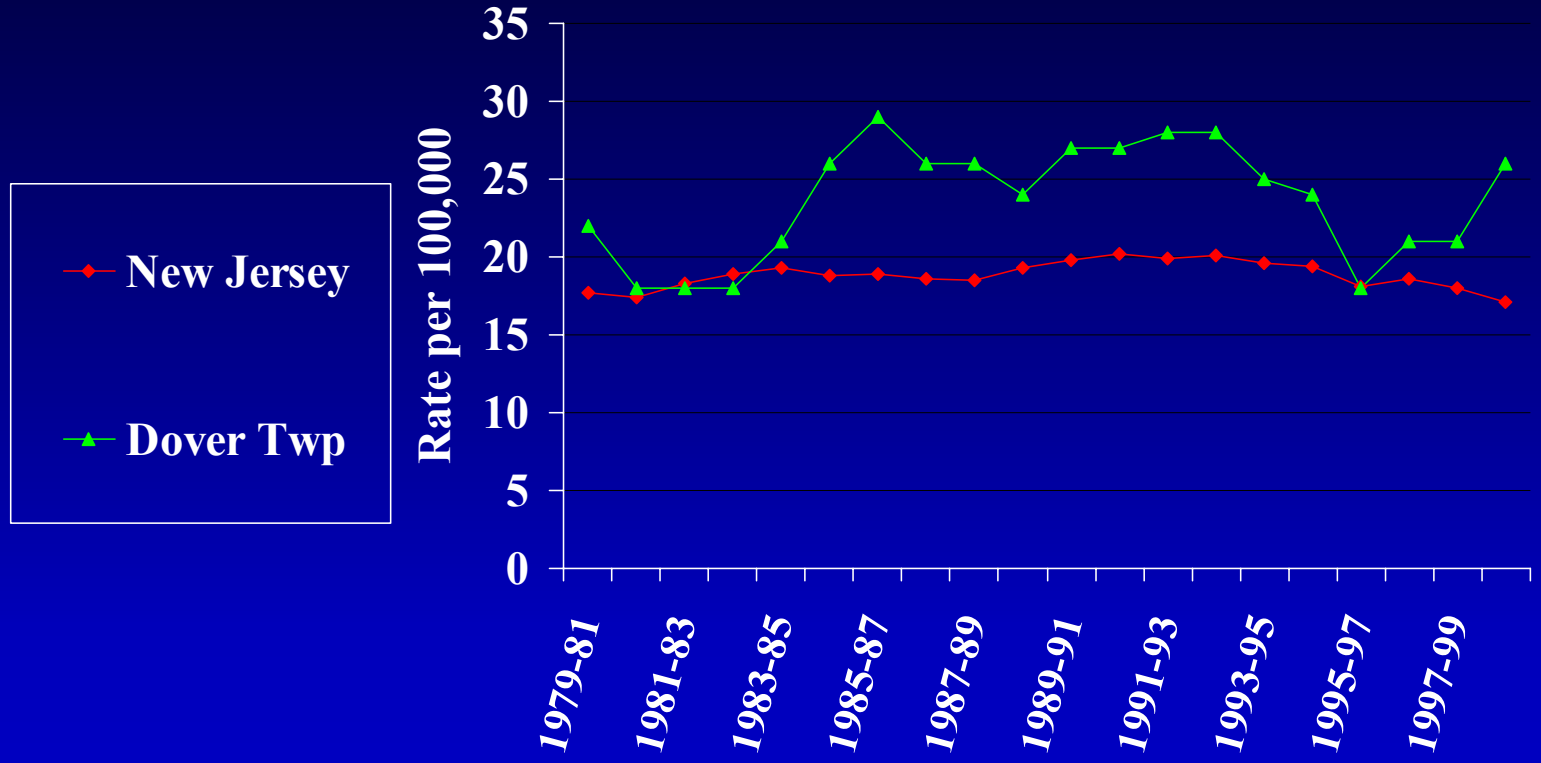
Leukemia (Age 0-19) and Prenatal Exposure to Wells G & H Woburn, MA

Group	*Exposure Level*	*Adj. Odds Ratio (Confidence Interval)*
Males and Females	Never	--
	Least	3.5 (0.2-58)
	Most	14.3 (0.9-225)

Leukemia Incidence in Woburn Age 0-18 Years, 1969-1999



Time Trend in Childhood Cancer Rates 1979-2000 (Revised and Updated)



Reports Available on Web

http://www.state.nj.us/health/eoh/hhazweb/dovertwp.htm