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CASE STUDY: MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH'S SOUTHEASTERN MASSACHUSETTS HEALTH STUDY ON LEUKEMIA AROUND PILGRIM NUCLEAR POWER STATION: WHO WON?

I'M HERE TODAY TO SPEAK ABOUT HOW A VERY DIFFICULT ISSUE - ONE WHICH ARISES FROM TIME TO TIME IN THE NUCLEAR INDUSTRY - WAS ADDRESSED BY ONE COMPANY. THE ISSUE IS OCCURRENCE OF LEUKEMIA AROUND PILGRIM NUCLEAR POWER STATION IN PLYMOUTH MASSACHUSETTS. THIS IS A STORY ABOUT HOW BOSTON EDISON COMPANY RESPONDED TO THE PRESS AND TO THE PUBLIC.

IN OCTOBER 1990, THE MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH RELEASED THEIR SOUTHEASTERN MASSACHUSETTS HEALTH STUDY. THIS IS A STUDY OF LEUKEMIA INCIDENCE IN 22 TOWNS AROUND PILGRIM NUCLEAR POWER STATION, FOR THE PERIOD 1978 THROUGH 1986.

FIRST, I'D LIKE TO GIVE YOU A LITTLE HISTORICAL NARRATIVE, JUST TO PUT THE EVENTS INTO CONTEXT.

PILGRIM STATION HAD BEEN RETURNED TO OPERATION FOLLOWING A 3-YEAR OUTAGE, FROM 1986 - 1989. DURING THIS PERIOD, SOME \$300 MILLION IN CAPITAL OUTLAY WAS INVESTED BY BOSTON EDISON IN UPGRADING SAFETY SYSTEMS AND INSTALLING THE SO-CALLED THREE MILE ISLAND UPGRADES. THESE WERE INDUSTRY-WIDE MEASURES WHICH WERE TAKEN BY ALL U.S. COMMERCIAL FACILITIES TO INSURE THAT A TMI-TYPE ACCIDENT WOULD NEVER OCCUR AGAIN AT A U.S. NUCLEAR POWER PLANT.

IN 1988, MASSACHUSETTS SENATOR TED KENNEDY REQUESTED THE NATIONAL CANCER INSTITUTE OF THE NATIONAL INSTITUTES OF HEALTH TO CONDUCT A STUDY OF CANCERS IN COUNTIES CONTAINING AND COUNTIES ADJACENT TO COMMERCIAL NUCLEAR REACTORS WHICH HAD BEGUN OPERATION PRIOR TO 1980.

IN MASSACHUSETTS, ATTORNEY-GENERAL SHANNON FILED THE FIRST OF MANY BRIEFS WITH THE U.S. CIRCUIT COURT OF APPEALS TO KEEP PILGRIM STATION CLOSED AND TO PREVENT THE START-UP OF SEABROOK STATION, A NEW COMMERCIAL NUCLEAR PLANT IN THE NEIGHBORING STATE OF NEW HAMPSHIRE. AN INITIATIVE PETITION ON THE NOVEMBER BALLOT IN MASSACHUSETTS THAT YEAR TO SHUT DOWN NUCLEAR POWER PLANTS IN MASSACHUSETTS FAILED.

THE U.S. NUCLEAR REGULATORY COMMISSION APPROVED RESTART OF PILGRIM STATION, AND THE FOLLOWING MONTH MASSACHUSETTS GOVERNOR MICHAEL DUKAKIS ASKED NRC TO KEEP PILGRIM SHUT DOWN.

SLIDES OF DUKAKIS NEWS STORY

IN 1989, WITH ALL WORK COMPLETED, PILGRIM WAS RESTARTED. DURING THE RESTART PERIOD, WHICH LASTED ALMOST THAT ENTIRE YEAR, THE ANTI-NUCLEAR COMMUNITY RAISED MANY ISSUES AS REASONS TO DISALLOW PLANT START-UP -- THE STATUS OF THE EMERGENCY PLANS FOR THE PLANT WAS A MAJOR FOCUS -- AND IN FACT, IN JUNE 1987, SEABROOK STATION HAD BEEN DENIED A LOW-POWER LICENSE BECAUSE OF INADEQUATE EMERGENCY PLANS.

## SLIDES OF 1988 NEWS STORIES

## 1989 WAS A YEAR OF VARIED ACTIVITIES:

A CITIZENS' MONITORING NETWORK AROUND PILGRIM STATION, WORKING UNDER A GRANT FROM THE DEPARTMENT OF PUBLIC HEALTH'S DIVISION OF RADIATION CONTROL, BEGAN TO RECORD DAILY READINGS OF AMBIENT RADIATION LEVELS, AND WERE SOON INSISTING THAT THEIR HAND-HELD DEVICES COULD DETECT EMISSIONS FROM THE PLANT. SUBSEQUENTLY, MONITORING EQUIPMENT GIVEN TO LOCAL SCHOOLS, AND OPERATED BY SCIENCE TEACHERS WAS ABLE TO SHOW CORRELATION BETWEEN HIGH RADIATION LEVELS AND RAINFALL.

## SLIDE OF GRAPH FROM HIGH SCHOOL MONITORING SYSTEM

THE SOUTHEASTERN MASS. HEALTH STUDY WAS IN PROGRESS, AS WELL AS THE NATIONAL CANCER INSTITUTE/NATIONAL INSTITUTES OF HEALTH STUDY.

THE MASSACHUSETTS ATTORNEY-GENERAL CONTINUED SEEKING VARIOUS INJUNCTIONS AGAINST PILGRIM STATION AS THE PLANT SLOWLY PROGRESSED THROUGH A 10-MONTH POWER ASCENSION AND TEST PROGRAM PRIOR TO RETURNING TO FULL OPERATION.

IN THE AFTERMATH OF THE 1988 PRESIDENTIAL ELECTION IN WHICH VICE PRESIDENT GEORGE BUSH DEFEATED MASSACHUSETTS GOVERNOR MICHAEL DUKAKIS, ACROSS-THE-BOARD BUDGET CUTS HAD BEEN INITIATED TO REDUCE THE SIZE OF STATE GOVERNMENT AND BRING THE MASSACHUSETTS STATE BUDGET UNDER SOME CONTROL PRIOR TO THE 1990 STATE ELECTION CAMPAIGN.

EMERGENCY RESPONSE PLANS CONTINUED TO BE MUCH IN THE NEWS, WITH A COMBINED FUNCTIONAL EXERCISE HELD FOR PILGRIM STATION IN OCTOBER, INVOLVING FEDERAL, STATE AND LOCAL AGENCIES, AS WELL AS BOSTON EDISON PERSONNEL.

IN DECEMBER OF 1989, THE BEIR V (BIOLOGICAL EFFECTS OF IONIZING RADIATION) COMMITTEE RELEASED ITS REPORT ON "HEALTH EFFECTS FROM EXPOSURE TO LOW-LEVEL IONIZING RADIATION", UPDATING THE WORK OF THE BEIR III COMMITTEE WHOSE REPORT HAD BEEN PUBLISHED IN 1980.

THE BEIR V REPORT STATED THAT "THE CANCER RISK ESTIMATES DERIVED WITH THE PREFERRED MODELS IN THIS REPORT ARE ABOUT 3 TIMES LARGER FOR SOLID CANCERS ... AND ABOUT 4 TIMES LARGER FOR LEUKEMIA THAN THE RISK ESTIMATES PRESENTED IN THE BEIR III REPORT." ALTHOUGH THIS STATEMENT WAS WIDELY QUOTED IN THE PRESS, FEW, IF ANY, REPORTERS WERE AWARE THAT THE NEW FIGURES WERE WITHIN THE CONFIDENCE LIMITS PREDICTED BY THE BEIR III MODEL -- IN OTHER WORDS, THIS REALLY WASN'T NEW OR STARTLING INFORMATION.

THE REPORT ALSO STATED " THE COMMITTEE RECOGNIZES THAT ITS RISK ESTIMATES BECOME MORE UNCERTAIN WHEN APPLIED TO VERY LOW DOSES". THIS WAS NOT SO WIDELY QUOTED.

DR. VAN DUNN, THEN DEPUTY COMMISSIONER OF THE MDPH, WAS QUOTED IN THE BOSTON GLOBE AS SAYING BEIR V "TAKES AWAY THE ARGUMENT THAT THERE

WASN'T ENOUGH RADIATION RELEASED FROM PILGRIM STATION TO INDUCE CANCERS".

(SLIDE OF VAN DUNN'S COMMENT)

IN JULY, 1990, THE NATIONAL CANCER INSTITUTE/NATIONAL INSTITUTES OF HEALTH STUDY, REQUESTED BY SENATOR KENNEDY, WAS RELEASED, REPORTING NO INCREASED CANCER RISKS IN THE STUDY COUNTIES. THE LEUKEMIA RATE REPORTED FOR PLYMOUTH COUNTY FOR THE 35-YEAR STUDY PERIOD WAS LESS THAN THE NATIONAL AVERAGE.

IN SEPTEMBER 1990, A STUDY WAS RELEASED SHOWING NO EXCESS OF LEUKEMIA AROUND THREE MILE ISLAND IN THE WAKE OF THE MOST SERIOUS NUCLEAR REACTOR ACCIDENT IN THE UNITED STATES.

EARLY IN OCTOBER 1990, THE ACROSS-THE-BOARD STATE AGENCY BUDGET CUTS INCLUDED THE MDPH'S DIVISION OF ENVIRONMENTAL HEALTH ASSESSMENT, WHICH WAS CARRYING OUT THE SOUTHEASTERN MASSACHUSETTS HEALTH STUDY AND OTHER SIMILAR STUDIES.

SLIDE OF NEWS STORY ABOUT DEHA BUDGET

ON OCTOBER 10, THE SOUTHEASTERN MASSACHUSETTS HEALTH STUDY WAS RELEASED AT A PRESS CONFERENCE HELD ON THE STEPS OF THE STATE HOUSE. THE MDPH DID NOT MAKE A COPY AVAILABLE TO BOSTON EDISON IN ADVANCE OF ITS RELEASE. DEHA'S BUDGET WAS REINSTATED SEVERAL HOURS AFTER THE PRESS CONFERENCE.

MY TOPIC FOR TODAY, ASIDE FROM THIS STROLL DOWN MEMORY LANE, IS HOW BOSTON EDISON RESPONDED. PROACTIVE MEASURES WERE TAKEN, AS MUCH AS POSSIBLE, PRIOR TO THE STUDY'S RELEASE.

(SLIDE -- HERALD HEADLINE)

EARLY ON IN THE PROCESS OF THE HEALTH STUDY, BOSTON EDISON HAD HIRED A CONSULTANT, EPIDEMIOLOGY RESOURCES INC., ERI, TO COMMENT ON THE MDPH STUDY PROTOCOL, AND TO REVIEW AND ANALYZE THE AVAILABLE HEALTH STATISTICS FROM THE MASSACHUSETTS CANCER REGISTRY. ALL OF ERI'S REPORTS WERE MADE AVAILABLE TO MDPH, AS SOON AS THEY WERE PRESENTED TO THE COMPANY. IN ADDITION, BOSTON EDISON'S CHIEF RADIOLOGICAL SCIENTIST TOOK ALL THE PLANT MONITORING DATA AND CONSERVATIVELY CALCULATED WHAT DOSE FROM PILGRIM STATION HAD BEEN RECEIVED BY THE ORIGINAL 5-TOWN STUDY POPULATION.

THIS DATA WAS COMPARED TO EXPOSURE TO NATURAL BACKGROUND RADIATION, WHICH WAS SEVERAL ORDERS OF MAGNITUDE LARGER, AND TO THE BEIR V ESTIMATES OF THE AMOUNT OF RADIATION NEEDED TO CAUSE 1 CASE OF LEUKEMIA. ACTUAL PLANT EMISSIONS FOR THE ENTIRE 20-YEAR PERIOD OF PLANT OPERATION HAVE BEEN 100 TIMES LOWER.

THIS SLIDE SHOWS CUMULATIVE OFFSITE EMISSIONS FROM PILGRIM STATION AND COMPARES IT TO NATURAL BACKGROUND RADIATION EXPOSURE, FOR THE ENTIRE OPERATING PERIOD OF THE PLANT.

(SLIDE -- CUM RAD EXPOSURE TO POP W/IN 20 MILES)

THE IMMEDIATE RESPONSE TO THE RELEASE OF THE SOUTHEASTERN MASS. HEALTH STUDY -- THE ONLY ONE THAT COULD BE MADE WITHOUT KNOWING WHAT MDPH HAD DONE TO COME UP WITH THEIR RESULTS, WAS TO EMPHASIZE WHAT WAS KNOWN TO BE TRUE ABOUT PLANT EMISSIONS.

IN REPORTING THEIR STUDY RESULTS, THE MASS DEPARTMENT OF PUBLIC HEALTH CLAIMED AN "ASSOCIATION" BETWEEN OPERATION OF PILGRIM STATION AND LEUKEMIA INCIDENCE FOR 1978 THRU 1983, AND NO ASSOCIATION FOR THE BALANCE OF THE STUDY PERIOD, 1984 THRU 1986, AN UNUSUAL FINDING FOR A STUDY LIKE THIS.

"ASSOCIATION" IS A PRECISE TERM IN EPIDEMIOLOGY. RATHER THAN GIVING THE ALL-INCLUSIVE TECHNO-JARGON DEFINITION, I'LL EXPLAIN IT IN THE CONTEXT OF THE TOPIC -- THERE'S A NUCLEAR POWER PLANT IN PLYMOUTH AND THERE ARE PEOPLE WHO HAVE LEUKEMIA IN PLYMOUTH. ONE FACT MAY OR MAY NOT HAVE ANYTHING TO DO WITH THE OTHER. "ASSOCIATION" MAY OR MAY NOT INDICATE CAUSATION -- IT SIMPLY SAYS THAT THERE ARE TWO FACTS AND THEY MAY OR MAY NOT BE CONNECTED.

THIS IS A FINE POINT, ONE TOTALLY LOST ON REPORTERS COVERING A STORY LIKE THIS ONE.

THE COMPANY BELIEVED THAT THE ACTUAL EXPOSURE TO THE RESIDENTS WITHIN 20 MILES OF THE STATION WAS COMPELLING EVIDENCE THAT THERE WAS A MAJOR FLAW IN THE STUDY WHICH SHOULD BE INVESTIGATED.

IN THEIR EARLIER PRESENTATIONS, MDPH HAD TRIED TO MAKE THE CASE THAT THERE WAS A "KEYHOLE" EFFECT -- THAT HIGHER EMISSIONS AT THE PLANT FROM 1974 THRU 1976 RESULTED IN HIGHER NUMBERS OF LEUKEMIA FOLLOWING A LATENCY PERIOD OF 5 TO 7 YEARS.

SLIDE - LEUKEMIA CASES IN THE 5 TOWNS CLOSEST TO PNPS

THE PUBLISHED STUDY COVERED A 22-TOWN AREA. THIS SLIDE SHOWS EXPECTED AND OBSERVED LEUKEMIA CASES FOR THE 5 TOWNS NEAREST PILGRIM STATION FOR 1982 TO 1986. THIS INFORMATION INCLUDES PLYMOUTH, DUXBURY, PLYMPTON, KINGSTON, AND CARVER. IN THIS SLIDE, YOU CAN SEE A VERY SMALL DIFFERENCE BETWEEN THE EXPECTED NUMBER OF CASES AND THE NUMBER OF CASES OBSERVED. IF YOU ARE WONDERING "WHAT'S THE FUSS" AS YOU LOOK AT THIS DATA, YOU'VE GOT THE POINT OF THIS PRESENTATION.

THE ONLY WAY TO RESPOND TO ANY ISSUE, ESPECIALLY ONE AS EMOTIONALLY CHARGED AS THIS ONE IS TO BE CONSISTENT. IN ORDER TO BE CONSISTENT, YOU HAVE TO BE HONEST. CANDOR GOES ALONG WITH HONESTY.

OUR BASIC RESPONSE WAS THEREFORE TO SAY WHAT WE KNEW ABOUT PLANT EMISSIONS, TO COMPARE PLANT EMISSIONS WITH WHAT IS KNOWN ABOUT RADIATION EXPOSURES WHICH MAY RESULT IN LEUKEMIA -- THAT PLANT EMISSIONS FOR THE ENTIRE OPERATING PERIOD OF PILGRIM STATION ARE 100 TIMES LOWER THAN THE DOSE REQUIRED TO CAUSE EVEN ONE CASE OF LEUKEMIA IN THE GENERAL POPULATION. PLANT EMISSIONS ARE ALSO A MINUSCULE FRACTION OF BACKGROUND RADIATION LEVELS.

(SLIDE -- CUM RAD EXPOSURES W/IN 20 MILES)

WE DID NOT KNOW FOR THE FIRST 24 HOURS AFTER THE SMHS WAS RELEASED THAT THE MODEL THEY USED DOESN'T INCLUDE A TERM FOR EITHER EXPOSURE TO PLANT EMISSIONS OR TO NATURAL BACKGROUND RADIATION.

ON THE SECOND DAY FOLLOWING THE RELEASE OF THE SMHS, THE PRESIDENT OF BOSTON EDISON HELD A PRESS CONFERENCE WITH THE COMPANY'S CHIEF RADIOLOGICAL SCIENTIST AND OUR EPIDEMIOLOGICAL CONSULTANT.

HE REAFFIRMED THAT THE PLANT HAD NOT EMITTED ENOUGH RADIATION OVER ITS ENTIRE PERIOD OF OPERATION TO RESULT IN EVEN A SINGLE EXCESS CASE OF LEUKEMIA, THAT THE MANAGEMENT OF BOSTON EDISON IS DEDICATED TO SAFE OPERATION OF THEIR FACILITIES, AND HE CALLED UPON THE CENTERS FOR DISEASE CONTROL AND THE NATIONAL INSTITUTES OF HEALTH TO REVIEW THE SMHS. IN TIME, THE AGENCIES DECLINED, SAYING THAT THIS WAS NOT A PART OF THEIR MISSION.

AS COPIES OF THE SOUTHEASTERN MASS HEALTH STUDY BECAME AVAILABLE TO THE SCIENTIFIC AND MEDICAL COMMUNITIES, SO MANY QUESTIONS WERE RAISED ABOUT THE CONDUCT OF THE STUDY, FOR EXAMPLE --

4 TOWNS WITH HIGH LEUKEMIA RATES AT THE EDGE OF THE STUDY AREA WERE OMITTED FROM THE STUDY, ALTHOUGH THEY WERE NAMED AS PART OF THE STUDY AREA

EMISSIONS DATA FROM PLANT OPERATIONS DID NOT SUPPORT THE STUDY'S CONCLUSIONS, ESPECIALLY COMPARED WITH EXPOSURE TO NATURAL BACKGROUND RADIATION

THE DATA ITSELF DIDN'T APPEAR TO SUPPORT THE STUDY'S CONCLUSIONS

(SLIDE -- 5-TOWN CANCER STATS)

TECHNICAL ISSUES WERE RAISED ABOUT THE CONDUCT OF THE STUDY

THE RESULTS OF THE SOUTHEASTERN MASSACHUSETTS HEALTH STUDY WERE INCONSISTENT WITH RESULTS OF THE LARGER NATIONAL CANCER INSTITUTE/NATIONAL INSTITUTES OF HEALTH STUDY

-- SO MANY IMPORTANT ISSUES WERE RAISED ABOUT THE SMHS THAT

MDPH AND BOSTON EDISON AGREED TO APPOINT A 6-PERSON PANEL OF PEER REVIEWERS, ALL OF WHOM ARE INDEPENDENT OF BOTH BOSTON EDISON AND THE MDPH.

TO RETURN TO THE DAYS AND WEEKS FOLLOWING THE RELEASE OF THE SOUTHEASTERN MASS HEALTH STUDY, THE COMPANY'S SCIENTISTS AND CONSULTANTS PORED OVER THE STUDY TO REVIEW ITS METHODOLOGY AND TO SEE HOW PLAUSIBLE THE RESULTS MIGHT BE.

THIS IS WHAT WE SEE WHEN WE TAKE THE DATA FROM THE SOUTHEASTERN MASS HEALTH STUDY AND ANALYZE IT THE SAME WAY THAT THE NATIONAL CANCER INSTITUTE ANALYZES ITS DATA FOR THE SURVEILLANCE EPIDEMIOLOGY AND END RESULTS PROGRAM. THE NINE SEER AREAS SERVE AS A BENCHMARK FOR DISEASE RATES IN THE UNITED STATES.

(SLIDE -- COMPARISON OF MDPH RESULTS WITH NATIONAL SEER DATA)

AS YOU CAN SEE, THE RATE FOR LEUKEMIA INCIDENCE FOR THE SOUTHEASTERN MASSACHUSETTS HEALTH STUDY AREA IS LOWER THAN THE RATES FOR ALL OF THE SEER AREAS.

THIS FINDING IS TOTALLY CONSISTENT WITH THE 35-YEAR STUDY OF CANCER IN COUNTIES CONTAINING AND ADJACENT TO, NUCLEAR POWER REACTORS PUBLISHED BY THE NCI/NIH IN 1990, WHICH SHOWS THE RATE OF LEUKEMIA FOR ALL OF PLYMOUTH COUNTY TO BE BELOW THE NATIONAL AVERAGE FOR THE YEARS 1950 THRU 1984.

THE MOST COMPELLING EVIDENCE AGAINST THE MDPH'S WORK HAS COME WITH THE RELEASE OF THE REPORT OF THE 6-PERSON INDEPENDENT REVIEW PANEL.

ON OCTOBER 24, A FRIDAY AFTERNOON, BOSTON EDISON LEARNED THAT THE COMMISSIONER OF PUBLIC HEALTH HAD RECEIVED A COPY OF THE REPORT, AND THAT THE COMPANY WAS EXPECTED TO REQUEST A COPY FROM HIM. WE WERE CERTAIN THAT IF THE REPORT WERE UNFAVORABLE TO MDPH, THE COMMISSIONER WOULD RELEASE IT QUIETLY AND IMMEDIATELY, AS IT WOULD LIKELY APPEAR IN THE SATURDAY PAPERS, AND THE STORY WOULD BE OVER BY THE FOLLOWING MONDAY.

THEY DID NOT RELEASE THE REPORT AT THAT TIME. IN NOVEMBER, AFTER THEY REALIZED HOW SERIOUS THE REPORT'S CONTENTS WOULD DAMAGE THEM, THEY TRIED TO RELEASE IT ON THE WEDNESDAY AFTERNOON BEFORE THE 4-DAY THANKSGIVING HOLIDAY. THEY FINALLY ENDED UP MAILING IT WITHOUT ANY COVER LETTER OR EXPLANATION TO THE MEDIA. ON THE MONDAY AFTER THE HOLIDAY, ONLY ONE REPORTER RECOGNIZED WHAT THE REPORT MEANT, RAN THE STORY, AND SCOOPED EVERYONE ELSE. MEDIA COVERAGE WAS NOT SO DENSE AS IT WAS FOR THE ORIGINAL STORY, BUT A LOT OF THE REPORTERS WERE FURIOUS WITH THE MASSACHUSETTS DEPT. OF PUBLIC HEALTH.

A COPY OF THE PEER REVIEW PANEL REPORT IS ATTACHED AS APPENDIX BECAUSE OF THE INTEREST IN THE SOUTHEASTERN MASSACHUSETTS HEALTH STUDY IN EUROPE. THERE ARE THREE MAJOR POINTS THE PANEL MADE WHICH I WOULD

LIKE TO SHARE WITH YOU:

1. NO EXCESS OF LEUKEMIA WAS FOUND AROUND PILGRIM STATION.
2. THE SOUTHEASTERN MASSACHUSETTS HEALTH STUDY OVER-PREDICTED BY A FACTOR OF 90 THE NUMBER OF LEUKEMIA CASES ATTRIBUTABLE TO PLANT OPERATION.
3. THE SOUTHEASTERN MASSACHUSETTS HEALTH STUDY FAILED TO ACCOUNT FOR EXPOSURE TO NATURAL BACKGROUND RADIATION, WHICH REPRESENTS FAR LARGER BIOLOGICAL EXPOSURE THAN PLANT OPERATION.

GIVEN ALL OF THIS, ONE MIGHT ASK WHY DIDN'T COMMON SENSE PREVAIL IN THE BEGINNING? ONE ANSWER MIGHT BE THE ENERGY OF THE MEDIA IN PURSUING THE STORY AND PLAYING IT UP NO MATTER WHAT. ANOTHER ANSWER MIGHT BE THAT THE ORIGINAL STUDY PURPORTED TO SHOW "WHAT EVERYONE KNOWS". NO ONE REALLY STOPPED TO QUESTION WHETHER THE STUDY WAS POLITICALLY MOTIVATED, GIVEN THAT THE DIVISION OF ENVIRONMENTAL HEALTH'S BUDGET HAD BEEN CUT.

THE TITLE OF THIS PRESENTATION INCLUDES THE RHETORICAL QUESTION "WHO WON?" IN A SENSE, IF THERE WERE WINNERS, THEY WERE THE RESIDENTS OF THE 22 STUDY COMMUNITIES. THEY, AT LEAST, SHOULD NOW BE CONFIDENT THAT THEY ARE NOT AT ELEVATED RISK OF LEUKEMIA BECAUSE OF LIVING NEAR A NUCLEAR PLANT.

DID THE MASS. DEPARTMENT OF PUBLIC HEALTH WIN? THE PEER REVIEW PANEL SAID THAT THERE SHOULD BE FURTHER STUDIES, AND DID MAKE SOME RECOMMENDATIONS ALONG THOSE LINES. SHOULD A GOVERNMENT AGENCY CAPABLE OF SUCH GROSS POLITICAL DECEPTION BE EXPECTED TO BE ABLE TO PRODUCE A WORTHWHILE PRODUCT?

DID THE PROFESSIONAL SCIENTIFIC COMMUNITY WIN? DID THE PEER REVIEW PANEL'S FINDINGS VALIDATE ALL OF THE WORK DONE BY MAINSTREAM SCIENTISTS ON HEALTH EFFECTS OF IONIZING RADIATION? "FRINGE" SCIENTISTS WILL STILL CARRY ON BUSINESS AS USUAL. THE HARD-CORE ANTI'S WILL STILL PUSH THEIR CAUSE IN THE SAME SPIRIT OF "THE END JUSTIFIES THE MEANS", HOWEVER FLAWED THE MEANS MAY BE. THE MEDIA WILL STILL GIVE COVERAGE TO THE WHOLE PANOPLY, WITH GUSTO.

EVEN ON THOSE OCCASIONS WHEN AN ISSUE IS RESOLVED LOGICALLY AND SCIENTIFICALLY, IT TAKES A VERY LONG TIME FOR EMOTIONAL ACCEPTANCE TO CATCH UP WITH WHAT WE HAVE LEARNED INTELLECTUALLY.

JUST REMEMBER, IN THE WORLD OF ANCIENT GREECE, MATHEMATICIANS HAD MEASURED THE CIRCUMFERENCE OF THE EARTH WITH UNEXPECTED ACCURACY. IN THE MIDDLE AGES, EVERYONE "KNEW" -- FROM INTUITION -- THAT THE EARTH WAS FLAT, AND THAT IF YOU SAILED TOO FAR OUT IN THE OCEAN, YOU'D GO OVER THE EDGE. THAT REMAINED THE PREVAILING POPULAR BELIEF UNTIL LONG AFTER THE FIRST CIRCUMNAVIGATION.

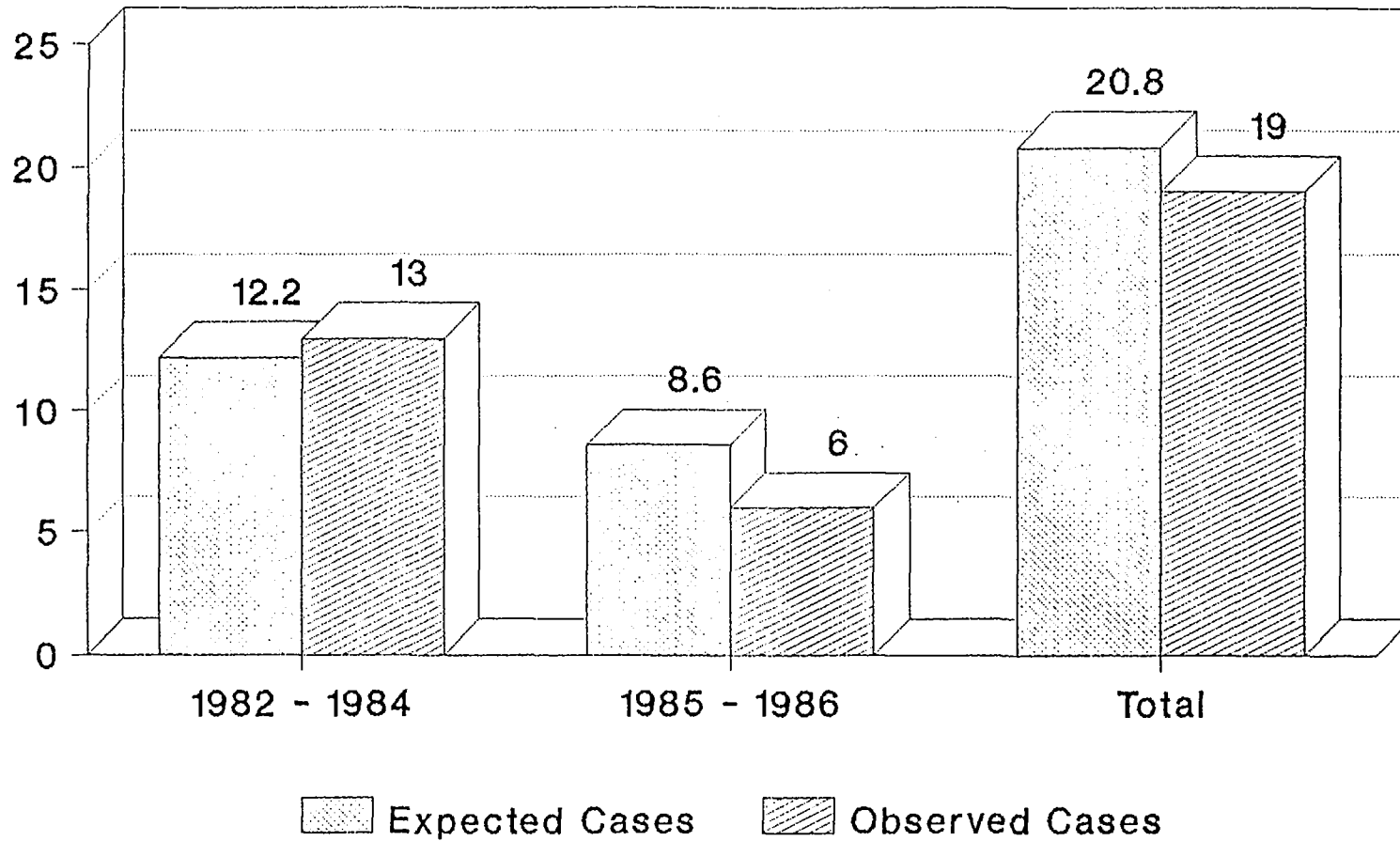
WE'RE STILL FACED WITH THAT SAME PHENOMENON OF HUMAN NATURE TO WHICH ALL OF US ARE SUSCEPTIBLE, -- THE WILLINGNESS TO BELIEVE, AND THE STRONG DESIRE TO CHERISH THOSE BELIEFS , ABOUT WHAT WE "KNOW" IS TRUE ACCORDING TO INTUITION, -- EVEN THOUGH THAT MAY MEAN REJECTING THAT WHICH HAS BEEN LOGICALLY AND SCIENTIFICALLY DOCUMENTED AND PROVEN.

THERE'S ANOTHER MESSAGE CONTAINED IN ALL OF THIS, AND IT HAS TO DO WITH A GROWING LACK OF TRUST IN "AUTHORITIES". THAT'S ANOTHER ISSUE FOR A SEPARATE PRESENTATION.

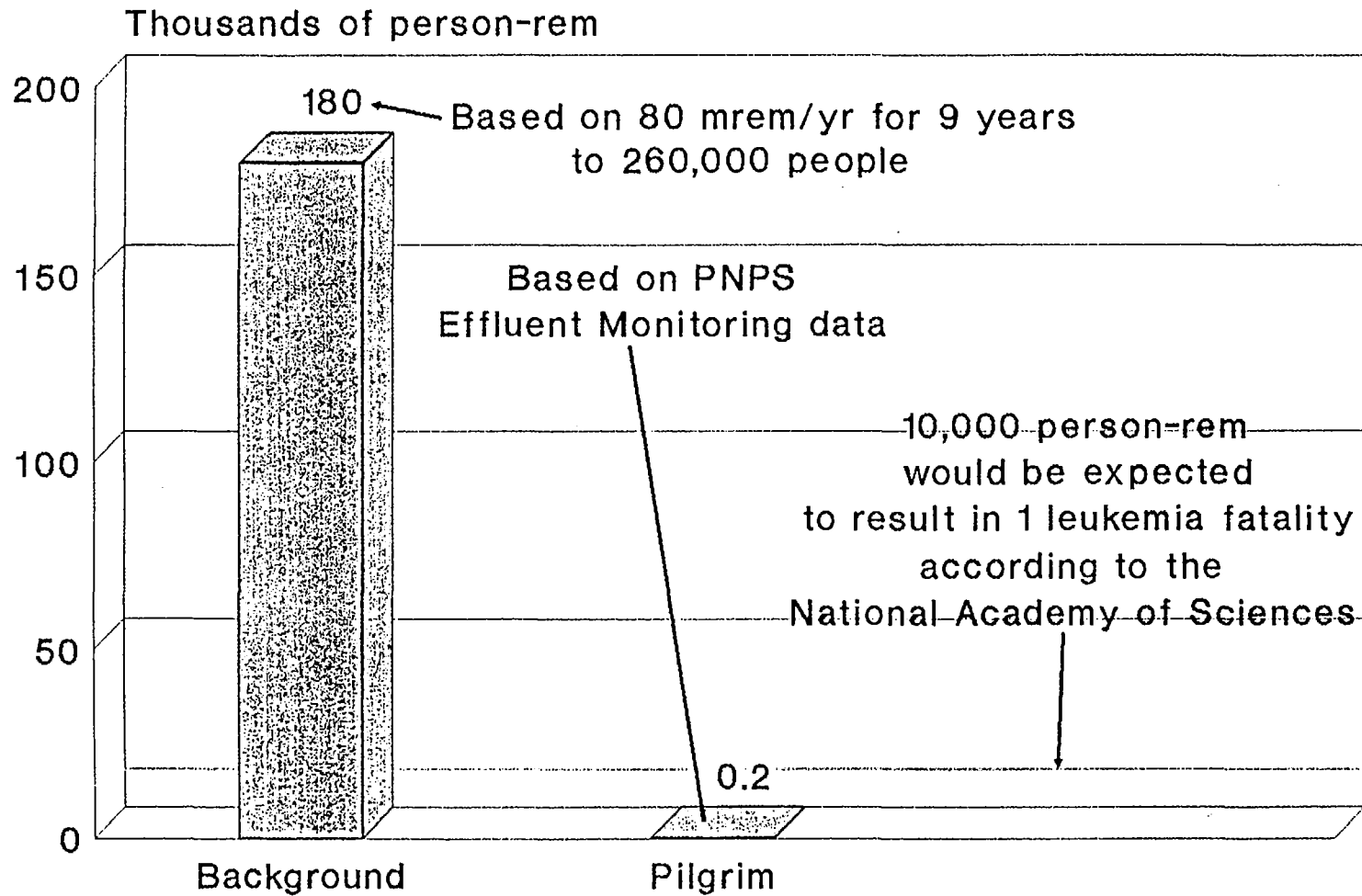
MEANWHILE, THIS QUESTION WILL COME UP AGAIN. THE ANTI'S WILL CONTINUE TO PUSH FOR STUDIES OF LEUKEMIA AROUND NUCLEAR POWER PLANTS. QUESTIONS WILL BE RAISED, COUCHED IN LOGICAL TERMS AND ROOTED IN EMOTION. AS OFTEN AS THIS HAPPENS, WE HAVE TO GIVE ANSWERS, AND THEY HAVE TO BE CONSISTENT, HONEST, AND OFFERED IN GOOD FAITH. IF WE DO THAT, THEN EVERYONE WILL WIN.



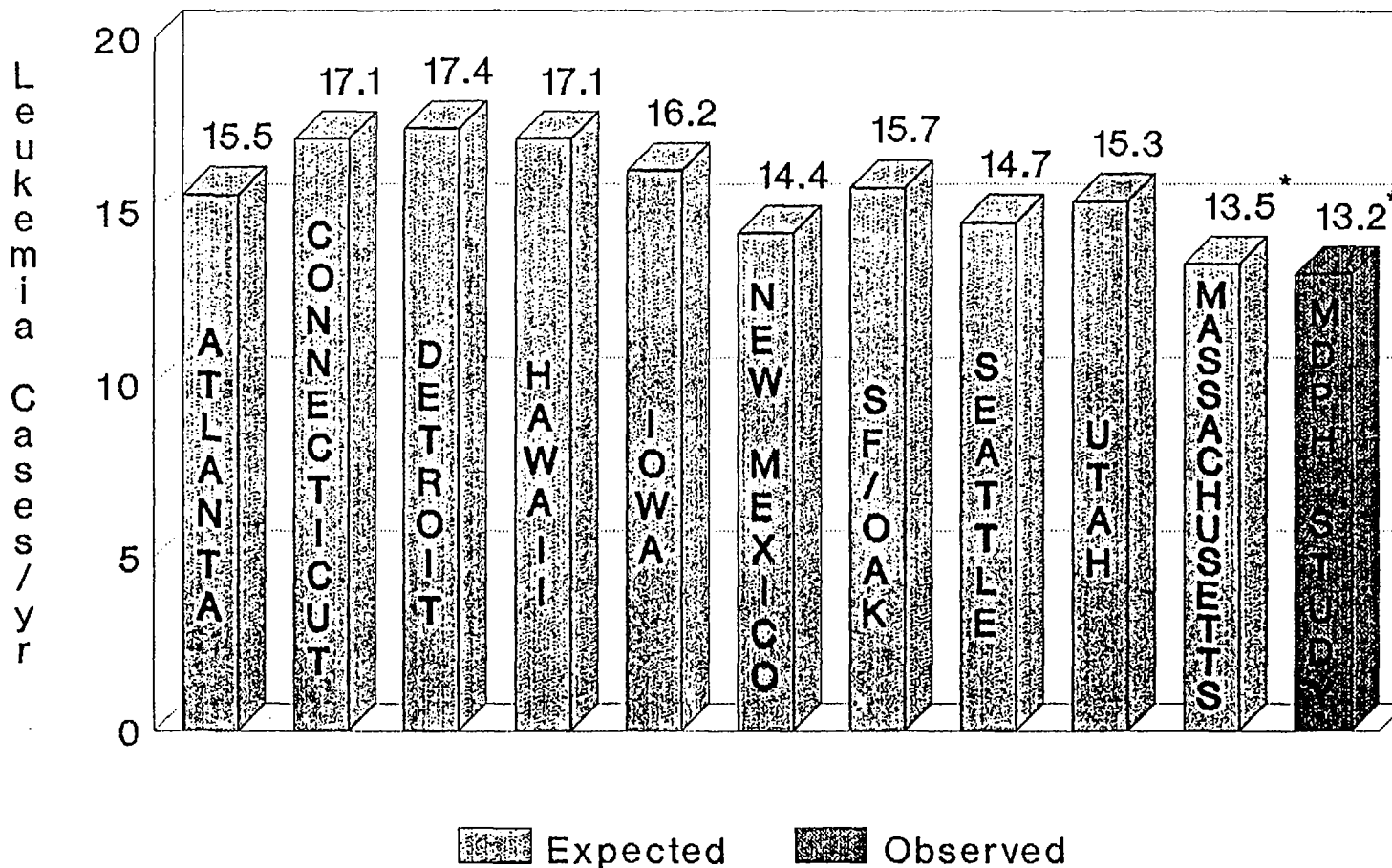
# Leukemia Cases in the Five Towns Closest to Pilgrim



### Cumulative Radiation Exposures within 20 miles of Pilgrim from 1972 to 1980



## Comparison of MDPH 1990 Study Results with National SEER Data for 1978 to 1983



\*non-SEER data

Source: Poole (1991)