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Brodeur Testifies Before Nebraska Legislature

Provides Evidence that Power Line EMF's Cancer Link is Conclusive

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Editors Note: Award-winning author Paul Brodeur was asked by the EMF citizen activists group POWER (People Organized for Wise Energy Representation) to address the Natural Resources Committee of the Nebraska State Legislature on February 8th in connection with a proposed 96 mile, 345,000 volt electric transmission line. Following is a transcript of Mr. Brodeur's testimony.

I have been asked by the group called People Organized for Wise Energy Representation to present to you today the medical and scientific evidence regarding the cancer hazard posed by exposure to electromagnetic fields (EMFs) given off by high voltage and high current power lines. I very much appreciate the opportunity to appear before you and to address this important public health issue.

The evidence that power line electromagnetic fields can either cause cancer or promote its development is not at all inconclusive, as you have been led to believe by previous witnesses, but is very powerful. The evidence is, in fact, so powerful that I believe it will persuade you to support the resolution before you. which calls upon the Nebraska Public Power District to delay construction of the 96 mile-long, 345,000 volt Pauline-Moore transmission line until November 1995 or later.

Unlike some previous witnesses who have appeared before you, I do not intend to talk in generalities. or to make assertions that I cannot document. I will start out by telling you that a majority of the medical and scientific studies published in the peer reviewed medical literature show that children living in homes near high voltage or high current power lines, as well as workers exposed to power-frequency electromagnetic fields on the job, are developing cancer at significantly higher rates than children and workers who are not exposed. or who are less exposed.

I offer as documentary proof of this statement an 11-page summary of the findings of the epidemiological studies of the cancer-producing effects of power line electromagnetic fields as compiled

by the National Library, - of Medicine, in Bethesda, Maryland. I wish to emphasize that this list of epidemiological studies and their findings comes from the medical database of the National Library of Medicine. It includes the childhood residential studies and the adult occupational studies with original data that have been published in the peer reviewed medical literature. Peer review means that before these studies were accepted for publication in the distinguished medical journals in which they appear, they were reviewed for accuracy and soundness of methodology and other scientific parameters by peer scientists.

I emphasize this point because most of the so called "negative" studies that have been cited by previous witnesses and by electric utility officials as finding no cancer hazard associated with electromagnetic fields are not, in fact, peer reviewed studies of cancer in human beings. Most of these negative studies do not contain any original data, nor have they been subjected to peer review. Most of them simply contain the undocumented opinions and assertions of members of ad-hoc committees, who are often paid consultants of the electric utility industry.

Please note that in the list of original peer reviewed studies provided to you, those findings that Medical scientists consider to be statistically significant have been marked with an asterisk and yellow marker. Note also that statistically significant findings of brain cancer have been additionally marked with a red check.

The odds ratio (OR) refers to the ratio of cancer that has been found in the population of children or workers exposed to electromagnetic fields as compared to the ratio of cancer one would expect to find in a population of children or workers not exposed to such fields.

Now, if you will, kindly go to page 1 of the list. Pages 1 through 3, come under the heading CHILDHOOD RESIDENTIAL LITERATURE. These three pages contain the findings of ten studies of children living in homes near high voltage or high current power lines. All ten childhood studies have been conducted during the past 16 years, and all of them have been published in the peer reviewed medical literature.

Note that the very first study on page 1 -- the pioneering study published by Dr. Nancy Wertheimer in the American Journal of Epidemiology, in 1979 found that children living in homes near high current power lines in Denver, Colorado, were developing leukemia, cancer of the nervous system (brain cancer), and lymphoma more than twice as often as children who lived in low current homes.

Wertheimer studied 344 childhood cancer victims and compared them with 344 control children, who had the same or close birth dates, but had not developed cancer.

Please note the third study on page 1. This was a study conducted by Dr. Lennart Tomenius, the County of Stockholm health officer, of Stockholm, Sweden, in the early 1980s. Dr. Tomenius studied 716 Swedish children who had died of cancer in Stockholm County. He found that brain cancer had occurred 3.8 times as often as expected among children living in homes within sight of high voltage transmission lines the same kind of lines as the proposed Pauline-Moore line.

The next to last study on page 1 was conducted in 1986 by Dr. David Savitz, an epidemiologist at the University of North Carolina. Dr. Savitz studied 356 childhood cancer victims in the Greater Denver area, the same area in which Wertheimer had conducted her study but none of the 356 cancer victims he studied were the same as Wertheimer's 344 victims. The children Savitz studied had all been diagnosed with cancer at a later date. Note that Savitz found more than twice the expected brain cancer among these children.

At the bottom of page 2, kindly note the statistically significant increase in the incidence of leukemia among children residing near high-voltage transmission lines in Sweden. This study was conducted during the early 1990s by Dr. Maria Feychting and some colleagues at the world-famous Karolinska institute, in Stockholm. Notice that children exposed to more than two milligauss-a magnetic field level commonly found in homes near high-voltage transmission lines, such as the Pauline-Moore line - develop leukemia almost three times as often as other children, and that children living in homes in which they are exposed to more than 3 milligauss have almost four times the risk of developing leukemia.

On Page 3 of the list taken from the medical data base of the National Library of Medicine are the last of the 10 childhood cancer studies involving electromagnetic field exposure that have been conducted during the past 16 years.

At this point, I should inform you that through an inadvertent error on my part one investigation was omitted from the list of the childhood residential studies compiled by the National Library of Medicine. This was a study of 232 childhood leukemia victims in Los Angeles that was conducted by Drs. Stephanie London and John Peters, of the University of Southern California School of Medicine, in Los Angeles. London and Peters found that children living in homes near high-current power lines developed leukemia more than twice as often as children who did not live in such homes. Their study was published in the American Journal of Epidemiology, in 1991.

Keeping in mind that these 11 studies comprise the total number of childhood cancer EMF studies in the peer reviewed medical literature, please note that 8 out of the 11 show that children living in homes near high voltage or high current power lines suffer a statistically significant increased risk of developing cancer mostly leukemia, brain cancer, and lymphoma -when compared to children who do not live in such homes.

Thus an overwhelming majority of the childhood residential studies published in the peer reviewed medical literature and compiled by the National Library of Medicine shows positive findings for cancer.

Note that 6 of the 8 studies showing excess cancer in children living near power lines were published in the American Journal of Epidemiology. This journal is put out by the Johns Hopkins University School of Public Health, in Baltimore, Maryland. It is considered to be the foremost epidemiological journal in the United States, and one of the most prestigious in the entire world.

Note that two of the studies appeared in the British Journal of medicine; that one appeared in the Scandinavian Journal of Medicine; and another in Bioelectromagnetics. All three are considered to be leading medical journals.

So much for the claim of the electric utility industry' that this is "junk science."

Please also note that each of the 11 childhood studies investigated the cancer incidence among children exposed to power-frequency magnetic fields as a result of living close to high-voltage or high-current power lines. None of the 11 studies investigated exposure to electromagnetic fields given off by household appliances or household wiring. Only a few of them contain any findings regarding exposure to appliances, and these findings are regarded as very incomplete, because they are based upon very small numbers. Electromagnetic fields drop off dramatically within a few inches of most household appliances, and exposure to appliances is intermittent at best and is not considered by most researchers to be anywhere near as important as the long-term chronic whole-body exposure that children undergo by virtue of living in homes close to power lines.

To put it colloquially, a child does not tend to hang out eight hours a day with a hair dryer, or sit next to the electric toaster or coffee maker for hours on end, or curl up beside the vacuum cleaner while it is in operation. But an infant living in a home near a high voltage transmission line, such as the proposed Pauline-Moore line, will be exposed to the magnetic field emitted by that line for 24 hours a day.

Members of the committee, I have carefully reviewed the testimony given by Dr. Thomas J. Safranek, the epidemiologist employed by the State of Nebraska Department of Health, who appeared before you on December 17, 1994. I find no mention whatsoever in his testimony of the childhood residential studies or of their findings of cancer.

Surely, you who represent the people of Nebraska have the right to expect that the state epidemiologist would be familiar with the childhood cancer literature, and that he would tell you that 8 out of the 11 childhood studies that have been published in the peer reviewed medical literature show that children living in homes near high voltage or high current power lines are developing and/or dying of cancer far more readily than children who did not live in such homes.

On page 85 of Dr. Safranek's testimony, in reply to a question posed by Senator Preister; Safranek stated as follows: "We are really beholden and committed to taking our marching orders ... and putting our faith in scientific methods done by credible scientific researchers who actually do research, you know, published in peer-reviewed journals."

That being the case, why did Dr. Safranek fail to tell you about a single one of the 11 childhood studies that have been published in the peer reviewed medical literature, or the fact that 8 out of the 11 show a statistically significant increased risk of cancer in children living close to high voltage or high -current power lines?

Pages 4 through 11 of the list before you contain the occupational studies. These are studies of workers who have been exposed to power frequency electromagnetic fields on the job. They include power linemen, telephone linemen, electric railway operators, electricians, electrical engineers, and so forth. Once again, the statistically significant findings of cancer have been highlighted for your attention with yellow marker, and the brain cancers they include gliomas and astrocytomas, which are malignant brain tumors - have been additionally highlighted with a red check mark

When you go through pages 4 through 11, you will see that a clear majority of the occupational studies show that workers exposed to electromagnetic fields on the job are developing brain cancer, leukemia, and lymphoma far more readily than other workers or less exposed workers.

Note that on page 5 there are five findings of excess brain cancer; that on page 6 there are two findings of excess brain cancer; and that on page 7 there are four findings of excess brain cancer. Note at the bottom of page 7 that the electrical workers studied by Susan Preston Martin and her colleagues at the University of California at Los Angeles' School of Public Health developed astrocytoma, a malignant tumor of the brain more than 10 times as often as other workers. On page 8, where there are no fewer than 10 findings of excess brain cancer, please note the study by Mack of 272 cases of brain tumors among electricians and electrical engineers. This study also found the incidence of astrocytoma to be more than 10 times expected.

To summarize: There are 30 occupational studies on the list before you, which has been compiled by the National Library of Medicine. Twenty-four out of the 30 show a statistically significant increased risk of cancer among workers exposed to power frequency electromagnetic fields on the job. Twenty-two of the 30 studies show excess brain cancer among workers exposed to power frequency electromagnetic fields.

Incidentally, two very recent occupational studies have not been included on the list before you. One of them is a study conducted by researchers at McGill University in Montreal of 223,000 electric utility workers in France and Canada. This study, which was published last year in the American Journal of Epidemiology, found that workers with heavy exposure to EMF had two and a half times the incidence of leukemia as workers with less exposure. Another occupational study was published just last month in the American Journal of Epidemiology by Drs. Savitz and Loomis, of the University of North Carolina. They investigated the mortality experience of 138,000 men employed at five large electric power companies in the United States, and found that those men with heavy exposure to EMFs were dying of brain cancer more than two and a half times as often as less exposed workers.

Is it not abundantly clear that, as with the childhood residential studies, an overwhelming majority of the occupational studies are positive for the occurrence of cancer?

Why, then, were you not informed by Dr. Safranek about the results of the 30 occupational studies that have been published in the peer reviewed medical literature, especially in light of the fact that Dr. Safranek assured you that he and his colleagues at the Nebraska State Department of Health take their marching orders from the peer reviewed medical literature?

Why did Dr. Safranek fail to inform you that 31 of the 40 epidemiological studies published in the peer reviewed medical literature show that people exposed to power frequency electromagnetic fields at home and at work are developing cancer more readily than other people?

I would like now to turn to a different subject, the record of the Nebraska Public Power District with regard to forthright disclosure about the medical studies showing the cancer threat posed by exposure to powerline electromagnetic fields.

On July 7, 1994, Mr. R. O. Oswald, the project manager for the Nebraska Public Power District's proposed Pauline-Moore high -voltage transmission line, wrote to Senator J. Robert Kerry and told the Senator that "Out of 20 epidemiological studies compiled over the past 15 years, only three show an association between cancer and electromagnetic fields."

How can that statement possibly be true when the epidemiological study list compiled by the National Library of Medicine shows that 31 of the 40 childhood and occupational epidemiological studies conducted over the past 15 years and published in the peer reviewed medical literature have found excess cancer either among children living in homes near high-voltage and high current power lines, or among workers exposed to power frequency electromagnetic fields on the job?

This same Nebraska Public Power District official wrote letters to Senator Kerry on January 7, 1994, and on July 7, 1994. Each of these letters contains the following sentence: "It seems that for every study that show a possible relationship between cancer and exposure to EMFs there is an equally respected study which shows no relationship."

Members of the committee, the Nebraska Public Power District has blatantly misrepresented the medical findings about the cancer hazard posed by exposure to power line electromagnetic fields to the United States Senator from the State of Nebraska.

To conclude this portion of my testimony, I would like to inform you that the complete 300-page text of the 40 epidemiological studies compiled by the National Library of Medicine will be made available to you should you so desire. I would also like to alert you to the fact that you have been furnished with a 17-page analysis of the epidemiological literature by Dr. David O. Carpenter, a physician and medical scientist, who is the dean of the School of Public Health at the State University of New York at Albany. I hope you will find the time to read Dr. Carpenter's analysis. He is a widely respected expert on the

health hazards posed by electromagnetic field exposure. He was the executive director of the New York Power Lines Project -- one of the most extensive investigations of the power line hazard ever undertaken. His curriculum vitae appears on page 17.

Members of the committee, even though a preponderance of the medical evidence clearly suggests that power line emissions pose a serious health hazard, no one can predict with certainty whether or not there will be an increased incidence of cancer among children and adults living near the proposed Pauline-Moore 345,000-volt transmission line, if the Nebraska Public Power District should proceed to build it. One can, however, infer potential risks by examining what has happened to children and adults living and working in neighborhoods where high voltage and high current transmission lines already exist and then take preventive measures to reduce those risks.

In this connection you will remember that when Dr. Safranek testified before you on December 17, he mentioned an investigation that he and some colleagues in the state health department had conducted regarding a cluster of childhood cancer that had occurred among children living in four adjoining zip code areas in the west central section of Omaha. He told you that thirty-eight cancers had developed among these children during the five-year period between 1987 and 1991. He and his colleagues acknowledged that this was 22 more cancers than should have occurred among these children during that period of time.

In their report, which is dated January 25, 1994, Dr. Safranek and his colleagues in the state health department declared that because the types of cancer that afflicted the children in the four zip code areas were "quite diverse", no causal agent could be identified. They concluded by saying that "For this reason, the Nebraska Department of Health has decided not to initiate any further study of this cluster, although as a precautionary measure, the NDOH will continue to monitor the incidence of cancer in this area."

This decision is somewhat puzzling, because a list of the 38 childhood cancers on page 12 of the report shows that 17 of them are cancers known to be associated with exposure to power frequency electromagnetic fields. They include 6 malignant brain tumors; 3 leukemias; 3 cases of non-Hodgkin lymphomas; 3 melanomas of the skin; one case of Hodgkin Disease; and one additional cancer of the blood forming system. (Excess melanoma in workers exposed to power frequency EMF has been reported by the federal Environmental Protection Agency).

In the concluding section of their report, Dr. Safranek and his colleagues declared that "There is little environmental information to suspect that this particular section of the city, [the four zip code areas] harbors a unique risk to children for developing cancer." Elsewhere, however, they acknowledged that in one of the four zip codes 68144, 17 children had developed cancer, whereas only 6.4 cancer cases were expected and that the American Telephone & Telegraph Company (AT&T) operates a large manufacturing plant on the southern boundary of this zip code.

The disclosure about the AT&T plant aroused my curiosity, so I decided to look into it. I started out by contacting as many people as I could, who had knowledge of the AT&T facility and followed the story as far as it led. This is what I learned.

During the past three years, a major workmen's compensation action has been making its way through the Nebraska state court. The plaintiffs in the case are the survivors of 7 men who died of malignant brain tumors during the five-year period from 1989 to 1994. The workmen's compensation action alleges that the 7 dead workers developed brain cancer as a result of occupational exposure to electromagnetic fields.

All seven men worked at the AT&T plant. Not only did all of them work at the plant, they all worked in Building 30 at the plant. Not only did they all work in Building 30, they all worked in the southern portion of Building 30.

The southern part of Building 30 is the site of an extensive electroplating operation, many welding assembly lines, and a carbon block operation.

Large rectifiers are used to convert alternating current to direct current in the electrolytic process of the electroplating operation. These rectifiers produce immensely powerful electromagnetic fields. So powerful are these fields that some men working near the rectifiers report that their hair stands on end, and that they have to remove their wrist watches, because the strong magnetic fields make their watches go "haywire".

Multiple welding heads were used in automation lines that until recently, made wire comb relays. Each of 12 wire-comb automation lines had two welding heads. The welding operations also gave off powerful electromagnetic fields.

Radio frequency energy is used in the carbon block operation. So powerful is the radio frequency radiation given off by the heat sealers on the south side of Building 30 that during the 1980s it interfered with the communications of planes flying into and out of the Strategic Air Command (SAC) center at Offutt Air Force Base. It also interfered with the communications of amateur radio operators in the Omaha area. The problem was solved by building a Faraday cage around the workers in the carbonblock operation to keep the radiation inside the plant.

The 7 deaths from brain cancer among men working in Building 30 is considered to be extraordinary by all of the medical researchers and neurological scientists with whom I spoke last week. Indeed, it is ten to twelve times the number of brain cancer deaths that should have occurred during that five-year period among the men who worked in Building 30.

During the past twenty years, a total of 13 brain cancer deaths are known to have occurred among men working in the south portion of Building 30. However, the medical researchers I spoke with caution that because of turnover in the work force and the fact that many former workers in building 30 have undoubtedly left the Omaha area, the incidence of brain cancer among these workers is bound to be much higher. In addition, unconfirmed reports indicate that an unusually large number of men who worked in building 30 have died of leukemia and lymphoma.

Obviously, the cancer hazard in Building 30 should be the subject of an immediate investigation by the National Institute for Occupational Safety and Health.

Meanwhile, a potential connection between the cancer tragedy among the men who work in Building 30 and the cancer tragedy occurring among children living in the zip code areas to the north is not hard to make. The huge AT&T plant in west-central Omaha uses huge amounts of electrical energy. This electrical power is supplied to a substation near the plant by two high voltage transmission lines that run along separate corridors through residential neighborhoods in two of the zip codes where children are developing excess cancer. These two lines pass within 40 to 50 feet of many homes and office buildings. A 345,000 volt transmission line the same type as the proposed Pauline-Moore line runs through three of the zip code areas where children are developing excess cancer. It passes within a hundred feet of some homes.

Anyone driving through these areas, as I did yesterday, will be struck not only by how close the high voltage transmission lines are to homes, but also by the large number of electrical substations that are present in these neighborhoods, and by the large number of high current feeder lines that emanate from these substations. These high-current feeder lines give off very strong magnetic fields and they are dangerously close to hundreds of homes. Anyone who measures the strength of the power frequency magnetic fields at the doorways of such homes, as I did yesterday, will find that these fields are often many times stronger than the fields associated with cancer in the peer-reviewed childhood and occupational studies compiled by the National Library of Medicine.

Yet Nebraska State Department of Health officials never took a single electromagnetic field measurement when they investigated the cluster of 38 cancers among the children living in the four contiguous zip codes. Nor did they bother to investigate whether the childhood cancer victims lived near the high voltage transmission lines feeding electricity to the AT&T plant. Or whether they lived near the many electrical substations and high current feeder lines in these neighborhoods. Nor did the state health officials bother to look into the incredibly high rate of brain cancer deaths among men working in Building 30 at the AT&T plant. Or take into consideration the fact that the tragic situation there may be connected with the high cancer rate among the children in the four nearby zip codes.

Do the Nebraska state health department officials even know about the extraordinary brain cancer cluster among the men working in Building 30?

Instead of conducting a thorough investigation of the cancer cluster of the four contiguous zip-code districts of west-central Omaha, the state health authorities declared that "There is little environmental information to suspect that this particular section of the city harbors a unique risk to children for developing cancer", and announced that they had decided not to initiate any further study of the childhood cancer cluster.

Members of the Natural Resources Committee, allow me to suggest that when the citizens of Omaha and elsewhere in Nebraska learn, as I did last week, that the incidence of childhood cancer in the four zip code areas of west central Omaha remained high for the sixth year in a row during 1992-the most recent year for which cancer statistics are available from the Nebraska Cancer Registry they may well demand that their representatives in the state legislature take action to reduce the exposure of unsuspecting Nebraskans to power line electromagnetic fields.

In closing, I hope that I have raised some questions in your minds about the potential cancer hazard that will result from exposure to electromagnetic fields given off by Nebraska Public Power Districts proposed 345,000-volt Pauline-Moore transmission line. I thank you for allowing me to bring the important public health hazard posed by power line emissions to your attention. I trust that you will give it serious consideration.

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