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St. Louis County Radioactive & Hazardous Waste Oversight Committee

January, 1994

cc:
Crispin
[Signature]

Dear Committee Members:

I was surprised and dismayed when I read the July 1993 edition of the FUSRAP newsletter and found the following article, which I must quote in full. I would greatly appreciate your taking the time to read the rebuttal that follows.

RECENT STUDIES ADDRESS RESIDENTS' SAFETY

Residents of Nyflot Avenue and Heather Lane in Hazelwood have received more good news about health risks associated with living near sites contaminated with low-levels of radiation. According to a recent study by the Missouri Department of Health, "the waste sites do not appear to pose a current threat to residents."

An inquiry from Nyflot Avenue residents concerned about the possibility of a high number of cancer cases in the area prompted the study, which was initiated in 1989.

Through interviews with current and former residents, examination of medical records, and a chronological construction of the deposition of radioactive materials, the Department's Division of Chronic Disease Prevention and Health Promotion was able to ascertain that "the types of radiation found in the area and the most likely routes of exposure for the current residents are not likely to lead to the types of cancer found in the residents."

This confirms the results obtained from two previous studies, which also concluded that the St. Louis area FUSRAP sites do not pose an unacceptable cancer risk to residents.

The Federal Agency for Toxic Substances and Disease Registry conducted an independent study released in 1991 that determined that a "cancer cluster" (a grouping of a number of cases of the same type of cancer) "did not exist in the area."

More recently, DOE's draft "Baseline Risk Assessment" indicated that "current radiation exposures fall well below DOE standards for the protection of human health." Janet Johnson, Ph.D., a health physicist acting as an independent consultant for the study conducted by MDOH, confirmed that "DOE's risk assessments are accurate and are based upon conservative assumptions."

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There are three important documents "summarized" by this brief article. I would like to treat each of them in turn, starting with the most important here, the MDOH Public Summary.

1) Mo. Dept. of Health Division of Health Promotion and Disease Prevention

I am not attempting to *prove* here that the Mo. Dept. of Health's conclusions are wrong. I am, however, attempting to show that they are open to serious question. This section is divided into two parts.

A. Problems with Epidemiology

The "Public Summary" of the study by the Mo. Dept. of Health was released in March of 1993. The study was the result of a public request from residents of Nyflot Ave., which is one of the closest residential streets to the Latty Ave. dump site, because of the high incidence of disease -- namely leukemia and cancer -- that has occurred so far on their street. Leukemia, as we know from the Hiroshima and Nagasaki studies, was the first prominent illness to become visible as the result of exposure to radiation from the bomb. Excess cancers started showing up later in these studies, and in much greater numbers than the leukemia cases. The Dept. of Health makes a nod to these facts by stating:

The cancers that have developed in residents of Nyflot Avenue are in tissues that have varying degrees of sensitivity to radiation induction of cancer. According to the Committee on the Biological Effects of Ionizing Radiation (BEIR III & V), leukemias have very high sensitivity to radiation; thyroid, very high sensitivity; and breast, high sensitivity. Lymphomas and the colon have moderate sensitivity. The skin and the prostate have low sensitivity (p.3).

There were four leukemias and one each of the other types of cancer uncovered, namely; thyroid, breast, lymphoma, colon, melanoma and prostate cancer: "The diagnosis dates of these 10 cancer cases in 9 individuals ranged from 1963 to 1989, with six of the cancers being diagnosed in the 1980's" (p.2). Having said this, the Dept. goes on to conclude that "... the types of radiation found in the area and the most likely routes of exposure for the current residents are not likely to lead to the types of cancer found in the residents" (p. 5).

The fact of the matter is this: There are three possible explanations for the high incidence of these predominately radiosensitive illnesses: 1) the radiation which these residents were surrounded by and exposed to for years caused the illnesses 2) the illnesses were caused by something else, i.e. some other carcinogen, family history, etc. or 3) the occurrences of the disease are totally random events. Guess which rubric the study's conclusions fall under? "Such small numbers of cases can occur in an area by chance, and it is impossible to judge their statistical significance" (p. 8).

On the contrary, while "small numbers" can be quite problematic in epidemiology, we can come up with some very sobering numbers in this case. The Department, however, has decided that nothing can be concluded about anything: "The committee decided that these difficulties preclude a meaningful statistical comparison in this case, so the likelihood of this group of cancer cases occurring by chance is unknown" (p. 8). The "difficulties" referred to here are summarized in the Public Summary's Appendix:

The second problem with determining whether or not the grouping of cancer cases on Nyflot Avenue represents an excess of cancer is the problem of comparing the number of cancer cases with the number to be expected. Many methods exist for making such a comparison, but in this case, serious difficulties exist in applying these methods. One difficulty is lack of information on the number of people who have lived on the street during approximately the last three decades. In order to accurately compare the amount of cancer on Nyflot Avenue with the amount in other geographic areas, one has to calculate the cancer rates for the areas to be compared. A cancer rate is calculated by dividing the number of cancer cases by the number of people who live in the area. But in order to calculate a meaningful cancer rate for such a small number of people, it is necessary to know not just how many people live on the street now, but how many have lived on the street over the past several decades, how long each person lived there and the age of each person. This type of information is very time-consuming to collect and may not be possible to collect completely.

The Dept. is making this much more difficult than it needs to be. I question all this business of "serious difficulties" and "very time consuming" and "not possible to collect completely." I spent one afternoon, (approximately 3 hours) at the County Recorder of Deeds office and found the number of owners (mostly married couples) who have occupied the properties in question, some with continuous ownership back to the 1940's. It appears that, in fact, it would have been incredibly *easy* to get a good approximation of the total number of people who have lived there by simply *asking* the residents during the interviews that were conducted in the course of the research on medical histories. In any event, given the very low turnover of ownership on this block since the 1950's, I don't feel it would be either a serious overestimate or underestimate to guess that approximately 100 people have lived there during the period that concerns us: remember, there were only eight houses on the block in question, of which only six remain. The exact number is also not important here, as we shall see momentarily. Obsessing over exact ages and length of residence is also overkill, since we are not talking about small percentages that need to be finely measured here: leukemia normally only strikes about **six out of one-hundred thousand Americans** (from U.S. Cancer Tables, 1980).

The line of logic adopted by the MDOH is indicative of the *misuse* of the discipline of epidemiology endemic to the governmental bodies entrusted with the public health in the realm of ionizing radiation. The argument is one we are all too familiar with in the corporate arena: the burden of proof lies with the victim. That burden of proof is all but impossible to fulfill. A simple example will illustrate. Let's say there are four cancers and a three-out-of-four probability that each cancer was caused by agent X. You have one of those cancers, but cancer caused by agent X and cancer caused by some other means are indistinguishable. You can not *prove* (i.e., as in a court of law -- beyond a reasonable doubt) that agent X was the cause of *your* cancer; you can only say that there is a *probability* that it was caused by the offending agent. This has been a common line of defense of the tobacco industry with lung cancer suits.

Just because you can't prove it doesn't mean it isn't so. And, I am certain, if a statistician were to figure the odds of this **incredibly high incidence** of leukemia happening by "chance", there would be too many zeros to count (the "small numbers" problem notwithstanding). The point is that the radiological filth that contaminates the Latty Ave. site and vicinity properties is the most *probable* explanation for this cancer cluster, and it is incumbent upon those who would say otherwise to come up with a *more plausible* explanation. The implication that these cancers are random is ludicrous.

B. Problems with Radiation Induced Carcinogenesis

There is yet another problematic element in the "conclusion", which for the sake of emphasis, I will repeat: "...the types of radiation found in the area and the most likely routes of exposure for the current residents are not likely to lead to the types of cancer found in the residents."

There are three key elements here: the types of radiation present, the routes of exposure, and the types of cancer produced.

The least troublesome element here concerns the "most likely routes of exposure": inhalation and ingestion of gaseous and particulate radionuclides (carried by dust and moisture).

But when we begin to examine the "types of radiation", the conclusion starts to unravel. The "types" of radiation are myriad! The principal contaminants of concern listed in the Agency for Toxic Substances and Disease Registry (ATSDR)

study are uranium (unspecified, but principally 238), thorium 230, thorium 232 and radium 226. In the Dept. of Energy's Baseline Risk Assessment (BRA) the contaminants of concern are the radionuclides in the thorium, uranium and actinium decay series. Obviously, these are the same, with the BRA being more comprehensive.

Let's examine one radionuclide of special concern, thorium. Thorium-230 has a half-life of 80,000 years and is considered by many to be almost as toxic as plutonium and americium, which, of course, are considered to be the most toxic substances known. A heavy metal, thorium tends to deposit in the liver, bone marrow, and possibly lymphatic tissue, where even minute quantities can cause cancer and leukemia. If inhaled, it can cause lung cancer. Since thorium, under many circumstances, is insoluble, it can become trapped inside the body where it can become a permanent source of irradiation.

The MDOH assertion -- that the types of radiation present would not lead to the types of cancer found -- is a NON-SEQUITUR when considering thorium alone (i.e., thorium, by itself, could theoretically have caused several of the diseases actually found in the residents); and that is not even considering the radiobiological properties of the 30-odd other radioactive materials that we have not yet delineated!

The notion that certain types of radiation lead to certain types of cancer comes from the observation that certain radionuclides mimic certain chemicals in biological systems. Radium, for instance, mimics calcium and thus tends to accumulate in bones, thus leading to bone cancer. While this is true, as far as it goes, it is not the end of the story. The underlying principle is that certain organs tend to receive a greater "dose" from certain "types" of radiation. However, it is absurd to think that ionizing radiation would be carcinogenic for some cancer-prone organs and not for other cancer-prone organs. Radium 226, for instance, is a powerful gamma as well as alpha emitter. It can take several feet of concrete to stop gamma rays. Any gamma source, whether it is inhaled, ingested or external, can deliver a dose to any organ anywhere in the body. This was demonstrated in the now infamous Radium Dial Painter studies, where there was a higher incidence of breast cancer, from external exposure, as well as bone cancer, from ingestion. Many and devious are the ways that ionizing radiation can poison the body. Any organ, exposed to any dose, is subject to a higher cancer risk.

And that brings us to the final confusing element in the MDOH's conclusion. It is intuitively obvious that the danger and exposure levels were higher in the past, when there was more radiological waste present at the Latty Ave. site, and when it was completely uncovered and unregulated. That we can not quantify those exposure levels is not the issue here. However, the Mo. Dept. of Health seems to want to argue out of both sides of its mouth: about the cancer cluster that has already occurred (which is supposedly random), and about the risk to the current residents (which supposedly does not exist). Given the potential flaws in logic and errors of fact laced throughout, the study's "conclusion" -- that there does not *appear* to be an *unacceptable* risk or danger to current residents -- rings hollow indeed.

We also bear witness here to a deceptive phrase that we find echoed throughout many proceedings involving the DOE, the EPA and radiation exposure: *acceptable risk*. One might very well ask: "Acceptable to whom?" While I will not take the time here to fully treat this insidious phrase, suffice it to say for the time being that a very convincing argument can be made showing that the DOE and EPA "standards for the protection of human health" may have less to do with "human health" and more to do with "economically feasible" methods for handling the seemingly endless problems associated with man-made ionizing radiation waste sources.

2) Agency for Toxic Substances and Disease Registry

To begin, I would like to quote the two-sentence conclusion of this study, *as stated in the study itself*:

Conclusion

Based on the information reviewed, the ATSDR considers the St. Louis Airport/Hazelwood Interim Storage/Futura Coatings Company NPL (Superfund National Priorities List) site to be a potential public health concern. Emission of Rn-222 into the air and the presence of Th-230 in off-site soils are considered the primary contaminants of concern for their presence could result in humans inhaling and ingesting these contaminants (p.11).

Could this possibly be the same report as cited in the FUSRAP article above?
Let's look more closely at the section cited in the FUSRAP article:

Community Health Concerns:

Concerns have been expressed about the nine cases of cancer reportedly found among the residents in the homes closest to the HISS. Citizens in this area of Hazelwood requested the Missouri Department of Health to investigate these cancer occurrences in the area and at other FUSRAP sites in the St. Louis area. This request has been referred to ATSDR. Members of the Division of Health Studies, ATSDR, have met with the State and investigated these complaints. As a result of this investigation, it was determined that a cancer cluster did not exist in the area surrounding the SLAPS.

A cancer cluster is used to describe similarities between cancers, and in this location nine different cancers were found. Furthermore, the types of cancers in the Hazelwood area are not normally associated with exposure to alpha emitters found at this site but with exposure to gamma radiation (p.4).

I would like to draw your attention to the sentence where italics have been added.

One would commonly understand "cancer cluster" to mean a "group of cancers", however the ATSDR apparently considers a "cancer cluster" to be a group of the *same* cancers. Since there were several *different* types of cancer on Nyflot Ave., this dismissal is a matter of semantic minimizing, and NOT a reflection of the impact on human health that actually took place in that small group of houses. The Mo. Dept. of Health Study addresses this semantic issue by stating in its Appendix:

Determining whether or not a cancer excess or a "cancer cluster" exists on Nyflot Avenue is hindered by at least two problems. The first problem is the existence of several different kinds of cancer among the cases. Generally, the term "cancer cluster" is reserved for a grouping of a number of cases of the same type of cancer. Underlying the concept of "cluster" is the notion that the cases in a cluster may be due to the same cause. Because different types of cancer generally have different causes, it is usually unlikely that a grouping of different types of cancer would arise from the same cause. However, in this particular grouping of cancers on Nyflot Avenue, the suspected cause is ionizing radiation, which is known to cause a number of different types of cancer. Therefore, it seems unwise to dismiss the possibility of a cluster in this situation, even though several different types of cancer are involved.

Let me quote again the relevant passage from the FUSRAP newsletter: "This *confirms* [emphasis added] the results obtained from two previous studies, which also concluded that the St. Louis area FUSRAP sites do not pose an unacceptable cancer risk to residents." First of all, the ATSDR study *confirms* nothing of the sort, and second, the finding of "no cancer cluster" is a semantic and not a medical determination.

3) The Dept. of Energy's Baseline Risk Assessment

This document is CRUCIAL to the evaluation of risk for the St. Louis sites. It is quite current, as it is dated May 1992. This section heads up their chapter called "Toxicity Assessment" and is entitled "Radiation Toxicity"(one page only):

Radiation health effects for humans have been confirmed only at relatively high doses or at high dose rates with large populations. At low doses, health effects are presumed to occur but can only be estimated statistically. Thus, risk estimates are strictly applicable only to large populations because the appearance of health effects after an exposure is a chance event. Predicting health effects with certainty for small populations (e.g., a few individuals) is not possible.

For purposes of radiological impact assessment, potential health risks are expressed as the increased incidence of cancer in the exposed population. However, risk estimates in the low dose range are uncertain because they are extrapolated from high doses using unconfirmed assumptions regarding dose-response relationships and the underlying mechanisms of carcinogenesis. In fact, studies of populations chronically exposed to low-level radiation, such as those residing in regions of elevated natural background, have not shown consistent conclusive evidence of an associated increase in the risk of cancer.

Radiation exposure pathways can be separated into either external or internal exposure. External exposure occurs when the radioactive material is outside the body. Internal exposure occurs when the radioactive material enters the body by inhalation or ingestion. Inhaled material can be exhaled, expelled from the lungs to be spit or swallowed and excreted, deposited in the lungs, or absorbed by the blood and relocated to other organs where it is excreted over time. Some ingested material enters the blood and is either excreted in the urine or feces or relocated to other organs and excreted over time; most insoluble ingested material is not absorbed into the blood but is excreted directly in the feces.

Alpha, beta, and gamma radiation are released during the radioactive decay processes of radionuclides in the thorium, uranium, and actinium decay series. Each type of radiation differs in its physical properties and in its ability to induce damage to biological tissue. Alpha particles are a hazard principally when taken into the body because, for external exposure, alpha particles lose their energy in the outer dead skin cell layer of the body before reaching living tissue. Within the body, they are the most effective of the three types of radiation in damaging cells because their energy is completely absorbed by tissue. Beta particles are primarily an internal hazard; however, in cases of external skin exposure, very energetic beta particles can penetrate to living skin cells, thus representing an external hazard as well. However, beta particles deposit less energy to small volumes of tissue and therefore induce much less damage than alpha particles. Gamma radiation is primarily an external hazard because it can penetrate tissue and reach internal organs. Alpha and beta particles are the dominant concern for internal exposures because their energy is absorbed in cells before the particles leave the body; gamma rays are most likely to leave the body without depositing a large fraction of their energy.

The sad truth is that fully ONE-HALF of the DOE's statements in this passage are either FALSE or MISLEADING, including the *entire* first paragraph (and all but the first sentence of the second)! I will briefly treat only one of the biggest whoppers here (if you would like a detailed explanation of the entire section, please feel free to contact me): "Risk estimates in the low dose range are uncertain because they are extrapolated from high doses using unconfirmed assumptions regarding dose-response relationships and the underlying mechanism of carcinogenesis."

The Hiroshima and Nagasaki Life Span Study is by far the largest and most complete human epidemiological study that we have to date on the effects of radiation on human health, comprising over 91,000 individuals followed since 1950. The largest cohorts of this group, totaling over 60,000, received what are considered "low" doses: 30 rads or less, some with an average in the area of 3 rads total exposure. These groups show conclusively that there is an increased cancer risk even at low doses. This conclusion is not "extrapolated" using "unconfirmed assumptions"; it is a direct observation of the best human evidence we have available. Because these groups are the largest, their numbers are also the most reliable of the entire study. Nor is this the only evidence we have from human epidemiological studies about the measurable carcinogenic effects of low-level radiation. This is not the time or the place to review that evidence. However, the DOE statement quoted above is unequivocally and absolutely false: while we may not be able to delineate the exact mechanism of the carcinogenesis (as we can not for asbestos and smoking inducing lung cancer for that matter), we have solid evidence from low dose and low dose-rate studies of the quantifiable risks associated with exposure to low-level ionizing radiation. Any statement to the contrary is a sham, and motivated by something other than science.

The "no current danger" mantra of the Mo. Dept. of Health's study and the DOE's Baseline Risk Assessment is seriously flawed, and should be critically re-examined. I, personally, feel that the waste should be removed from the city (all locations), and that the DOE should attempt to find an acceptable location. But whatever happens, I wanted to remind you of the debate going on right now about the dangers of low-level radiation -- between those who can prove that there is NO SAFE DOSE of ionizing radiation (as the term "safe" is commonly understood) and those who would have us believe otherwise. Low-level radiation is in fact now known to be *more effective per unit dose* than higher levels for cancer induction.

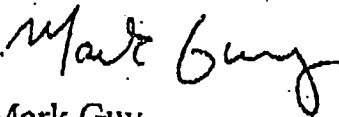
Nor is cancer induction the *only* possible effect of radiation on human health: the list of potential health effects is large, frightening, and growing. There is legitimate science which addresses the issue, as opposed to the pabulum (don't worry, be happy) and deception ("more good news") being fed to us; exemplified so beautifully by the FUSRAP fluff piece and all its "supporting" documents.

Dr. Johnson was right when she said the DOE's risk estimates were conservative: they're so conservative, they IGNORE the last 30 years of human epidemiological evidence.

Tragically, people may have died because of the nuclear wastes here in north St. Louis County, and the full extent of the suffering -- which is undoubtedly not over yet -- will never be known. The least we can do is tell the truth about it.

Thank you for your time and consideration.

Sincerely,



Mark Guy

Redacted - Privacy Act

p.s. You may obtain the complete references cited herein, if you would like, from Patti Hazel at Bechtel's office on Latty Ave., who has been quite courteous and helpful in supplying me with documents and information.



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