Stephen H. McCracken, Project Manager
U. S. Department of Energy
Weldon Spring Site Remedial Action Project Office
7925 Highway 94 South
St. Charles, Missouri 63304

Dear Mr. McCracken,

The time has come, it seems, when I can refocus on the goal of realistically evaluating the proposed actions for the Weldon Spring site. I do not refer to the real realistic evaluation because it surely is based on the actual hazard than risk analysis.

Recent reports on television and in news papers indicate, people are dying from exposures to toxic chemicals, nuclear power plant disasters, drunken drivers and incompetent health care. If one avoids these hazards and with little help from replacing the overused and tired organs and tissues, dying seems like a happening of the past centuries. All that needs to be done is to reduce life to zero risk. This will require first the full understanding of risk analysis as carried out by experts.

The comparitive listing of various risks (as provided in the RI/FS-EIS) makes it evident that I have to give up being a policeman with a 2×10^{-4} annual risk of death (AR), driving motor vehicles (2×10^{-4} AR), and being a "frequent flying" professor (6×10^{-5} AR). I was, to say the least, stunned to find that by switching from city water (6×10^{-7} AR) to what the Environmental Protection Agency considers contaminated water at the Raffinate pits, I could actually lower my risk by a factor of 500. It was also distinctly unnerving to find out that the potassium in my body, which contains a radioactive isotope, gave me 4-500 times the radiation level of that of the air around the Chemical plant area, and 100 times that from being a hiker in the Weldon Spring wild life area. Should we, I wondered, abandon superfund and find a substitute for potassium in the body? Astonishingly, corn contains aflatoxin at appreciable levels as does peanut butter and, for me, giving up these two delicacies is not going to be an easy trade-off for mere immortality. Apparently, plants learned through evolutionary time that chemical warfare is an extremely effective way to fight off fungi, insects, and animal predators. Unfortunately, these species have the same type of genetic code as I do, so that whatever I eat, I am consuming mutagens and carcinogens rated everywhere as hazardous to my health.

Clearly, to get to zero risk I must give up walking up and down stairs, not play physical sports, or live in a metropolitan area with a population higher than 100,000, and innumerable other temptations. I am willing to sit in a rocking chair with a lead roof over my head and be fed amino acids intravenously in order to live forever.

Still, a scientist does not necessarily see risk in the same way as the public does. The public regards deaths caused by mysterious and invisible technology (such as nuclear power plant failure or the threat from high voltage or electromagnetic fields) or the

simultaneous deaths of a large number of people (air plane crashes) as being far worse than those from well-known causes (from cancers directly related to smoking) or the same number of deaths occuring in multiple locations (as in automobile accidents). Therefore, I had no choice than to evaluate the proposed actions based on exhaustive scientific data contained in the RI/FS-EIS documents because excessive worry about the inherent value of the risk analysis can cause peptic ulcers and lead to my death from "natural causes".

Thus, although my commitment to the goal of immortality is unswerving, I am not positive that a zero risk society is yet in the immediate future. Given that as it may be, I am very comfortable that this report is based on the best available methodology and copmrehensive in its considerations. I also believe that the preferred alternative 6a of the Department of Energy was the result of very careful evaluation of cost-effectiveness, longevity of the cell's containment of hazardous material, and prudent management parctices. I fully concur with this alternative and list few minor comments in the next few pages.

On a personal note, I am extremely pleased with the gradual maturity of the project management and special improvements made in the scientific aspects of the project. I look forward to a successful remediation of the Weldon Spring Chemical plant area and the Quarry in the immediate future.

Sincerely,

L Rao Ayyagari

(L. Rao Ayyagari)
Professor of Biology
Lindenwood College
209 S. Kingshighway
St. Charles, MO 63301

Baseline Assessment: DOE/OR/21548-091
5-40
What are the total amounts of radioactivity in the entire contaminated area? There must be a way of determinung these quantities for each radioactive isotope.

5-41
The health effects associated with exposure to lead must be quantified in view of the sensitive effects on fetus and young children.

Tables D.3 & D.5 and I-39 of feasibility study
It seems odd to compare the contaminant concentration as acceptable risks based on EPA data. This is done by comparing with limits set by yourself and justifying the exposures acceptable at a later time.

Feasibility Study: DOE/Or/21548-148. VOL. 1

S-4 para. 1
Waivers are unacceptable during the remedial action period in view of higher exposures to Radon gas and its known effects on health.

para. 3 and p 6-41
The chemical treatment is a standard .....

I don't believe that this is a standard technology for heterogenous contamints, especially for radiactive material. See p. 3-35 under treatment.

S-3 para. 3
Review period should be decreased to every year to increase the public confidence of the safety of the project.

3-38
Treatment (biological)

Bioleaching methodology is available which concentrates Uranium. Why was this not considered?

Remedial Investigation: DOE/OR/21548-074

ES-3 and ES-7
Sodium sulfite and nitrate were found in high concentrations in the water.
Are these removed in the ion-exchange type of water purification plants?

5-126

The data provided on bio-uptake studies is from 1987-1990.

Do these data reflect all the studies carried out to date on biouptake?

Proposed Plan: DOE/OR?21548-160

p. 4 para. 2
Additional documentation is forthcoming.
When can we expect this?

p. 17 4.1.1
How many people use the surrounding wild life areas per year.
Should this not be considered in risk analysis?

p. 22 4.2 para. 2
Why only human health assessment?
Should include all the living species, so as not to decrease the diversity or cause extinction.

p. 35 para. 4
What about the release of gases from the mulch pile?
Radon may be released to the air.

p. 41 5.5 para. 2
Why would the cost of transporting the material over a longer distance be cheaper than to Utah?

p. 34. 5.2
Truck transport should be limited to the off-school hours to decrease the accidental exposure of contaminated material to students.

Some general comments:

Is there going to be a cover over the material in the TSA to minimize the release of Radon gas? If so, how do you decide the thickness of this protective layer?

Contingency plans for natural and/or human acidents and errors seemed to be non-existant. These are vital to the safety of the workers as well as the public.

Expression of Risks: Just as a comparison of risks is an aid in understanding them, so is a careful selection of the methods of expression. It is hard to comprehend the hazard quotients and index used in the preparation of the documents of this study. It is important to realize that risks appear to be very different when expressed in different ways (A. Taversky and D. Kahneman. SCIENCE.,

211,453 (1981)). One example of this can be seen if we consider the cancer risk to those persons exposed to radionucleides ater the Chrenobyl disaster. Acoording to the Soviets, the 2400 persons between 3 and 15 kilometers from the plant, but excluding the town of Pripyat, recieved and are expected to reciece 1.05 million man-rems total integraed dose, or about 44 rems average. Even if we asume a linear dose-response relation, with 8000 man-rems per cancer, the risk may be expressed in different ways. Dividing 1.05 million man-rems by 8000 gives 131 cancers expected in the lifetimes of that population. This is larger than, and for some people more alarming than, 31 people within the power plant itself who died within 60 days of acute radiation sickness combined with burns. Dividing the 131 again by the approximately 5000 cancer deaths expected from other causes, the accident caused "only" a 2.6% increase in cancer. This seems small compared to the 30% of cancers attributable to cigareete smoking. The difference is even more striking if we consider the 75 million pepole in Byelorussia and the Ukraine who recieved, and will recieve, 29 million man-rems over their lifetimes. On the linear dose-response relation this leads to 3500 "extra cancers", surely a large numbrn for one accident. But dividing by the 15 million cancers expected in the population leads to an "insignifacant" increase of 0.0047%. Of course, none of the methods of expressing the risk can be considered "right" in an absolute sense. Indeed it is my beleif that a full understanding of the risk involves expressing it in as many ways as possible.