

RulemakingComments Resource

From: Gretel Johnston <gretel@candel.net>
Sent: Saturday, September 26, 2015 7:42 PM
To: RulemakingComments Resource
Subject: [External_Sender] Reactor Effluents Comments [NRC-2014-0044]
Attachments: Reactor.Effluents.Comments.[Docket.ID.NRC-2014-0044].pdf; ATT00001.htm

Dear Rulemaking and Adjudications Staff:

Please accept my individual comments (see attached file) in response to the ANPR on Reactor Effluents Regulations.

Thank you,
Gretel Johnston

Encl: Reactor.Effluents.Comments.[Docket.ID.NRC-2014-0044].pdf

This e-mail and files transmitted with it may contain PRIVILEGED or CONFIDENTIAL information and should be read or used only by the intended recipient. If you have received this e-mail in error, please click Reply and purge this email and all attachments. Thank you.

September 26, 2015
Rulemaking.Comments@nrc.gov
U.S. Nuclear Regulatory Commission
ATTN: Rulemakings and Adjudications Staff

**Individual Comments on
Advance Notice of Proposed Rulemaking (ANPR) on
Radioactive Effluents Regulations (Docket ID NRC-2014-0044)**

As the author of Multi-Group Comments that will be submitted Sept. 30, 2015, I wish to submit my comments as an individual member of the public, as well as a member of one of the environmental groups who signed the Multi-Group Comments.

NRC's proposed elimination of the singular 'Standard Man' and acknowledgment of the far higher probability of ionizing radiation damage to women, children, infants and the unborn is welcomed. These steps help restore my confidence in the Nuclear Regulatory Commission (NRC) and its mission to protect the public from radiation poisoning. Nonetheless, I urge the Commission to only strengthen NRC dose protections in any Rulemaking and to delve into more recent research than the International Commission on Radiological Protection (ICRP) included in the 2007 recommendations in ICRP Publication 103, your ANPR basis. Many studies have been conducted on health issues near nuclear power plants (NPPs) since 2007; and furthermore, current effluents data is inadequate.

First, I assert that the data upon which effluent limits and dose calculations are based is not accurate data, since NRC only requires nuclear reactor licensees to report averaged quarterly effluent releases – not actual release levels, which now can easily be recorded using real-time online monitoring. Repeatedly, science shows unexplained discrepancies between expected and observed cancer rates near nuclear power plants. Licensees and regulators know that radioactive effluent release spikes happen during refueling, as well as during routine batch releases; so, averaging data over 3 month periods misrepresents these spike exposures. Given current real-time monitoring technologies, there is simply no excuse for using averaged data for estimated dose calculations, rather than using actual observed data for far more accurate dose calculations.

Second, I assert that this proposed Rulemaking is untimely, since it does not incorporate important research from numerous in-depth epidemiological studies published in the last nine years. Since the overwhelming majority of these recent studies show the public is more vulnerable to ill health due to ionizing radiation exposure than previously thought, the more current research should be thoroughly studied by the ICRP and the NRC before any reduction in public protection is proposed. As the Commissioners and NRC staff well know, the subtleties of bias and financial pressures can easily affect important decisions. I encourage you to increase environmental and public protections, since science clearly demonstrates that radiological exposure is harmful to human cells and DNA.

Basic Effluents Data is Averaged and Therefore Faulty

Exposure levels cannot be known and standards cannot be enforced when the actual data upon which the exposures and standards are based is inadequate. As long as the basic U.S. radiological effluents data is averaged, rather than based on comprehensive observed data, your dose calculation methodologies will render false results. The technology is now cost-effective and reliable for real-time, accurate 24/7 online monitoring (see examples at International Medcom, Inc., <https://medcom.com/>). Concerned citizens have taken the lead in monitoring, since the Environmental Protection Agency (EPA) and NRC-regulated deficiencies in monitoring were revealed as the Fukushima plume released radiation across our U.S. mainland in 2011.

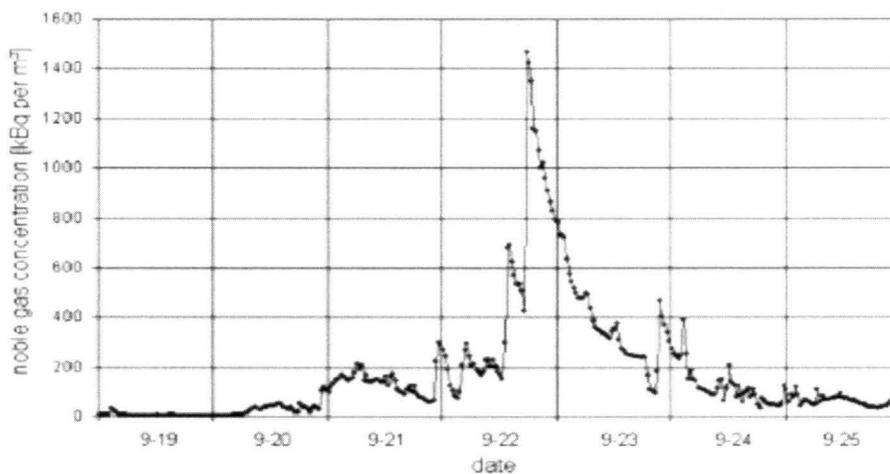


Fig. 3. Noble gas concentrations at Gundremmingen C, September 19– 25, 2011

Because there are larger releases during refueling and during batch releases and because radioactive isotopes are energetic and unstable, the current method of measuring releases on a weekly, monthly or quarterly basis is highly inaccurate. In fact, the current quarterly averaging of effluent releases (and therefore assumed doses to the public) reported to NRC annually are seriously inaccurate and unscientific. According to radiation biologist Dr. Ian Fairlie, during the brief periods of nuclear refueling (Fig.3), the "people living near and downwind from nuclear power stations may be exposed to higher exposures during these emission spikes than from releases during the rest of the year: estimates range from 20 to 100 times higher." ¹ In the Tennessee Valley, BEST/MATRR has recorded exposures 50 times higher than background levels.

Given this knowledge of increased exposure to the public during refueling as well as routine effluent releases, I request on behalf of public health that any new effluent rules include online licensee postings of refueling and effluent release schedules.

¹ Fairlie, Ian, "A hypothesis to explain childhood cancers near nuclear power plants," *Journal of Environmental Radioactivity*, 133 (2014) 10e17, Fig. 3, pg. 13. <http://dx.doi.org/10.1016/j.jenvrad.2013.07.024>

Although there is “strong evidence” for the carcinogenic effect of protracted low-dose radiation exposures,² the disproportionate effect on radiation risk is not yet understood. And though it is well established that “Ionising radiation causes leukaemia,”³ the “official” estimates of radiation dose levels from nuclear power plant effluents is “too low by orders of magnitude to explain the increased leukemias” internationally acknowledged to be inflicting children between the ages of 0-4 years living within 5 Km of nuclear power plants.⁴ These “official” exposure estimates may be based on faulty data.

In 2012, the Radiation and Public Health Project (RPHP) Board of Directors wrote a detailed analysis of your canceled NRC-commissioned National Academy of Sciences (NAS) study to the Committee on the Analysis of Cancer Risks in Populations Near Nuclear Facilities. The RPHP *Methodological Comments* analyzed the following issues:

1. Citations Exclude Studies of Populations Near U.S. Nuclear Plants
2. Citations Exclude Studies of Harm from Low Dose Exposures
3. Lack of Cancer Incidence Data
4. Lack of Release/Exposure Data
5. Lack of In-Body Dose Data
6. Lack of Data on Population Mobility and Risk Factors and
7. Limitation of Study to Cancer

(Please note number 4.) The *Structural Comments* noted conflicts of interest with industry and that “NRC Lacks Health Professionals,” among other issues.⁵ The errors in the NRC-NAS study were correctable (one purpose of Phase I), and the relatively small \$8 million cost cannot justify the NRC ignoring evidence of increased cancer rates near nuclear plants by cancelling your own study.

In 2014, an international conference of radiological specialists reviewed existing studies and analyzed methodologies. In the Section titled 2.2.4. *Exposure indicators*, they state:

Distance can be easily and reliably determined, but it constitutes only a crude proxy for radiation exposure from nuclear installations. Better exposure indicators are needed for investigating health effects around nuclear sites. This recommendation is in accordance with that of the NRC report which calls for absorbed doses to individual organs to be estimated^[47]

Based on the results from exposure monitoring or dosimetric estimates, the orders of magnitude of the doses attributable to current routine

² Klervi Leuraud, et al, “Ionising Radiation and risk of death from leukaemia and lymphoma in radiation-monitored workers (INWORKS): an international cohort study,” *The Lancet Haematology*, Volume 2, No. 7, e276-e281, July, 2015, pg e275.. [http://www.thelancet.com/pdfs/journals/lanhae/PIIS2352-3026\(15\)00094-0.pdf](http://www.thelancet.com/pdfs/journals/lanhae/PIIS2352-3026(15)00094-0.pdf)

³ Ibid, Leuraud, July 2015, e277

⁴ Ibid, Fairlie 2013, pg. 10

⁵ Robert Alvarez, et al, “Letter to Committee on the Analysis of Cancer Risks in Populations Near Nuclear Facilities,” Radiation and Public Health Project (RPHP), May 23, 2012. <http://radiation.org/>

discharges appear to be small. The so-called 'radioecological studies' conducted in the UK [56 -58], in Germany [59] and in France [60 , 61] indicated that the levels of doses attributable to releases from the plants were well below those due to natural sources of radiation (100 to 1000 times, or more) and could not explain the observed number of cases [62 , 63]. The feasibility and pertinence of measurements of radionuclides (tritium and carbon-14 and possibly other radionuclides) in environmental media or directly in children (e.g. urine analysis), or other dosimetric approaches to evaluate individual doses should be investigated, as the direct measurement of the body contents of radionuclides such as caesium-137 and plutonium-239/240 have provided valuable information in the past (e.g. [58 , 64 , 65]).⁶

The majority of studies rely on monitoring data, unless rare tests of urine, blood, baby teeth, biopsies or autopsies are performed and recorded. I question the lack of comprehensive monitoring data, with real-time monitors downwind and downstream. I agree that more radionuclide measurements in environmental media are needed, as well as studies of the children themselves; but it seems clear that the relatively simple installation of modern real-time online radionuclide monitoring equipment can be comprehensively implemented quickly and cost-effectively near U.S. nuclear power plants.

In July of 2014, the Electric Power Research Institute (EPRI) submitted recommendations to the proposed (and recently canceled) NRC-NAS Cancer Study regarding both atmospheric and liquid effluent nuclear releases. EPRI stated:

As discussed in an earlier EPRI report..., dose values reported by nuclear facilities should not be regarded as actual or estimated dose measurements to members of the public because the methodology, assumptions, and approaches used for nuclear facilities do not result in representative exposures to any real individual or population and vary greatly across facilities (EPRI 2011). Also, it is important that the NAS develop independent calculations of the releases and doses for the pilot study sites to establish the study's credibility. To make these calculations, it is necessary to establish exactly how much activity was released into the environment from each nuclear facility, what the activity was, and the temporal variations in releases. ... [Emphasis added.]⁷

Radioactive Effluent Release Limits cannot be regulated if the levels being released are unknown; yet this can be corrected, since the levels of radioactivity surrounding the plants can now be known with accuracy and shared online in real-time. Isotope-specific, 24/7

⁶ D Laurier, et al, "Childhood leukaemia risks: from unexplained findings near nuclear installations to recommendations for future research," *Journal of Radiological Protection*, June 18, 2014, J. Radiol. Prot. 34 (2014) R53-R68, <http://iopscience.iop.org/article/10.1088/0952-4746/34/3/R53/pdf>

⁷ Electric Power Research Institute, *EPRI Recommendations for the National Academies™ Pilot Study of Cancer Risks in Populations around Nuclear Facilities: Feasibility Study*, 3002003163, Final Report, July 2014, 4-1. <http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000003002003163>

online monitoring is now available and is cost effective. Combining comprehensive monitoring data with intelligent analytic software makes the dose value calculations recommended by EPRI achievable.

Current monitoring data based on averaging effluent releases is simply inaccurate, and modern comprehensive real-time online monitoring should be implemented and posted on licensee websites (and, perhaps in the future, on a theoretically less-biased and more easily regulated federal website, either the EPA or NRC sites or perhaps the Homeland Security website), and should be included in Reactor Effluents Regulations.

Now is the time for the NRC to implement modern standards for Radioactive Effluents monitoring, i.e. comprehensive 24/7 recording and scientific evaluation of commercial reactor effluent releases; and Radioactive Effluents monitoring data should be posted online in real-time for the public and scientists.

The public should be informed of effluent release schedules that could affect their health, and any Radioactive Effluents Rulemaking should require postings of refueling and effluent release schedules (and unscheduled releases and leaks) on a dedicated effluents page of each licensees' website, along with real-time monitoring data.

Premature Effluents Proposal Based on Outdated Studies

This Advanced Notice of Proposed Rulemaking (ANPR) proposes updating NRC standards to more closely align with ICRP recommendations made over eight years ago in the 2007 ICRP Publication 103. These 2007 ICRP recommendations were formulated before some very important epidemiological studies on the actual health effects of radioactive effluents on nearby populations were analyzed. The U.S. National Academy of Sciences Report on "Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII - Phase 2,"⁸ published in 2006, was not mentioned in the ICRP Summary or free Excerpts or in the *Journal of Radiological Protection* review of the ICRP Publication 103,⁹ nor was it mentioned in this NRC Advance Notice of Proposed Rulemaking (ANPR) on Reactor Effluents Regulations.¹⁰

The BEIR VII - Phase 2 Report was, of course, disliked by the nuclear community, which has gambled massive private and public monies on the nuclear power experiment. To learn that even very low exposures to ionizing radiation is harmful to humans and other living things, especially given the unsolved problem of radioactive waste sequestration, is difficult

⁸ National Research Council, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII - Phase 2*, National Academies Press, 2006, pg. 275.. <http://www.nap.edu/catalog/11340.html>

⁹ A.D. Wrixon, "Review: New ICRP Recommendations," *Journal of Radiological Protection*, J. Radiol. Prot. **28** (2008) 161–168. <http://iopscience.iop.org/article/10.1088/0952-4746/28/2/R02/pdf>

¹⁰ Nuclear Regulatory Commission, "Advanced Notice of Proposed Rulemaking on Reactor Effluents," Docket ID NRC–2014–0044, May 4, 2015. <http://www.regulations.gov/#!documentDetail;D=NRC-2014-0044-0002>

for investors, for licensees, for regulators and for workers; but this knowledge is highly relevant to any Rulemaking that involves the public's exposure to Radioactive Effluents.

The National Academy of Sciences/National Research Council BEIR VII Committee wrote:

The committee concludes that the current scientific evidence is consistent with the hypothesis that there is a linear, no-threshold dose-response relationship between exposure to ionizing radiation and the development of cancer in humans.¹¹

The report also suggested that genomic instability may be a significant factor in radiation cancer risk, stating because "error prone repair of chemically complex DNA double-strand damage is the predominant mechanism for radiation-induced gene or chromosomal mutation, there can be no expectation of a low-dose threshold for the mutagenic component of radiation cancer risk."¹² In other words, there is no safe dose.

This was the conclusion also reached by Dr. John Gofman regarding low dose exposures decades earlier.¹³ In 1954, Gofman was urged by his friend and colleague, Lawrence Livermore, to establish a Medical Department at the Livermore Radiation Laboratory. In 1963, another friend and colleague, chemist Glenn Seaborg, then chair of the Atomic Energy Commission (AEC), urged Gofman to develop a biomedical division at AEC's Livermore Laboratory (now the Lawrence Livermore National Laboratory (LLNL)) to study the effects of ionizing radiation on human health. The Livermore team "concluded that the risk of cancer from radiation exposure was far greater than the estimates the government was using to set limits on public exposures."¹⁴ **It is up to this Commission to ensure that future research does not reach the same conclusion of errors in governmental standards.**

The NAS BEIR VII Report was followed by several European studies. In 2008, the German government commissioned a meticulously conducted study, known as the KiKK Study, to determine if there was an increased incidence of childhood leukemia near nuclear power plants. The KiKK study found a 1.6 fold increase in the relative risk of total cancers and a 2.2 fold increase in leukemias among children under 5 years of age living within 5 km of all 16 nuclear power plants in Germany.¹⁵ When the findings were revealed, the Germans again commissioned a study to ensure the validity of the KiKK study, and it did indeed

¹¹ National Academy of Sciences, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII - Phase 2*, National Academies Press, 2006, pg. 323.. <http://www.nap.edu/catalog/11340.html>

¹² Ibid, National Academy of Sciences 2006, pg. 315.

¹³ John W. Gofman, *Radiation Induced Cancer from Low-Dose Exposure: An Independent Analysis*, 480 pp. San Francisco, Committee for Nuclear Responsibility, 1990. <http://www.ratical.org/radiation/CNR/RIC/indexT.html> (Note: an interesting *New England Journal of Medicine* review of both the NAS 1990 BEIR V Report and Gofman's book can be read at <http://www.ratical.org/radiation/CNR/RIC/NEJM.html>)

¹⁴ UC Berkley News, "John Gofman, anti-nuclear activist & lipid researcher, has died," September 4, 2007. http://www.berkeley.edu/news/media/releases/2007/09/04_GofmanObit.shtml

¹⁵ Peter Kaatsch, Claudia Spix, Irene Jung, Maria Blettner, "Childhood Leukemia in the Vicinity of Nuclear Power Plants in Germany," *Deutsches Ärzteblatt International*, Dtsch Arztebl Int 2008; 105(42): pg. 725

determine the validity of the earlier study. The KiKK study was followed by additional government-commissioned studies (in France, Switzerland, and England), whose findings echoed the increased cancer risks revealed in the KiKK study.

Four government sponsored studies conducted since the 2007 ICRP Publication 103 and after the 2008 KiKK study reveal the following increased observed leukemia cases near nuclear power plants – 130% to 141% higher than expected leukemia rates (see Table 1) ¹⁶ These findings could make a case for reducing allowable radioactive effluent release levels by the same percentages.

Table 1
Studies of observed (O) and expected (E) leukemia cases within 5 km of NPPs.

Dataset	O	E	SIR = O/E	90%CI	p-value
Germany	34	24.1	1.41	1.04–1.88	0.0328
Great Britain	20	15.4	1.30	0.86–1.89	0.1464
Switzerland	11	7.9 ^a	1.40	0.78–2.31	0.1711
France ^b	14	10.2	1.37	0.83–2.15	0.1506
Pooled data	79	57.5	1.37	1.13–1.66	0.0042

^a derived from data in Spycher et al. (2011).

^b acute leukemia cases.

I call on the NRC to protect us from the long-term damage that ionizing radiation is known to cause to the structure of DNA by improving Radioactive Release Standards. Because ionizing radionuclides are among the most toxic pollutants known to man, some remaining harmful for millions of years, and because they can damage us at even the smallest doses, I call on you to adhere to protecting the people, not the industry, with your Radioactive Effluents Release Regulations.

One specific way you can protect the public is for NRC to adhere to verifiable dose exposures, not just statistical risk scenarios. This is not accident risk analysis; instead, this is verifiable health science. The NRC should only express radiation exposure limits in terms of scientifically verifiable radiation dose exposures, not the more easily manipulated risk probability scenarios. Radioactive Effluents cannot be regulated if the quantity and duration of effluent releases and environmental exposures are not known at any given time. Effluents can now be measured in real-time, so NRC regulations should require online real-time effluents data be made available to the public and the scientific community. Scientific knowledge is based on verifiable observed evidence.

¹⁶ Ian Fairlie, “A hypothesis to explain childhood cancers near nuclear power plants,” *Journal of Environmental Radioactivity*, 133 (2014) 10e17, Table 1. pg. 11. <http://dx.doi.org/10.1016/j.jenvrad.2013.07.024>

Local Citizen Monitoring and Epidemiological Studies

It is important to remind everyone considering these important issues surrounding radiation dose limits that these standards affect real people in our communities. In the Tennessee Valley, where BEST/MATRR is monitoring and studying the effects of nuclear power plants on the environment and the people of the valley, there appears to be strong evidence of ill health surrounding nuclear facilities, suggesting you should be lowering the amount of radiation released into our environment.

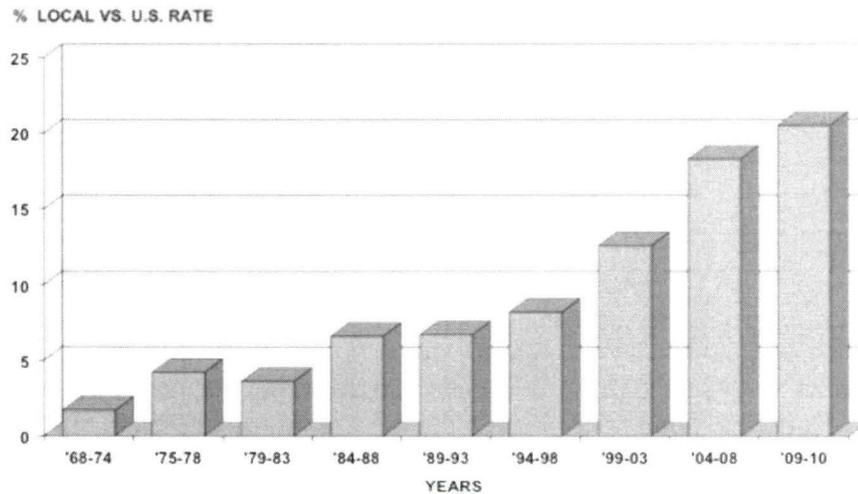
After Browns Ferry Nuclear Power Plant first began releasing radionuclides into the environment (1973), the mortality rate in seven counties near and downwind of the North Alabama plant rose from under 2% to over 20% higher (2010) than U.S. rates. Local mortality rates in the seven counties are especially high for young people. The rate for young persons who died at

age 0-24 was 27.4% above the national rate, and the rate for adults aged 25-44 was 25.7% higher than average U.S. communities. Available evidence indicates an apparent pattern of ill health surrounding all nuclear plants in the Tennessee Valley.

MORTALITY RATE, 1968 - 2010

7 Alabama Counties

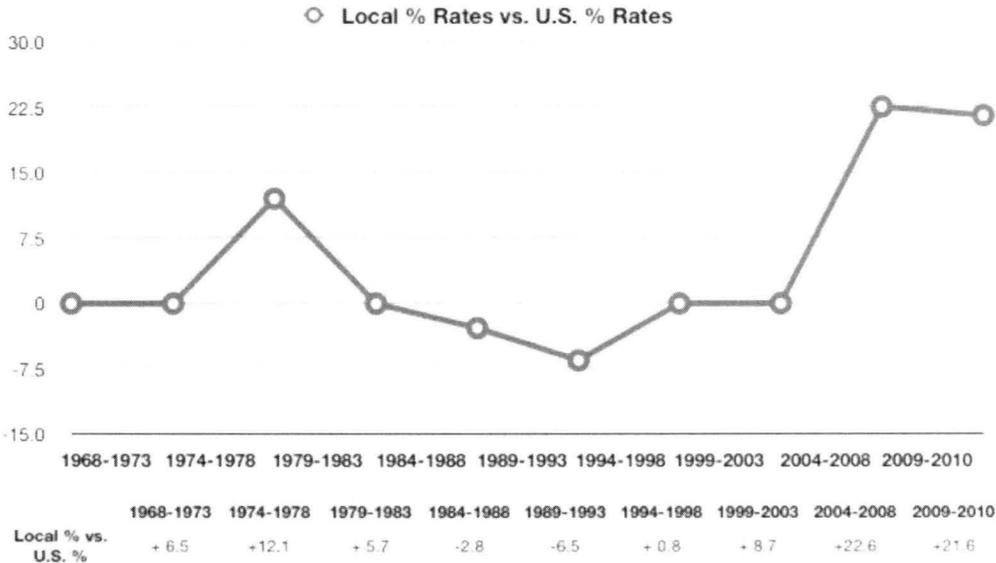
Downwind of Browns Ferry vs. U.S.



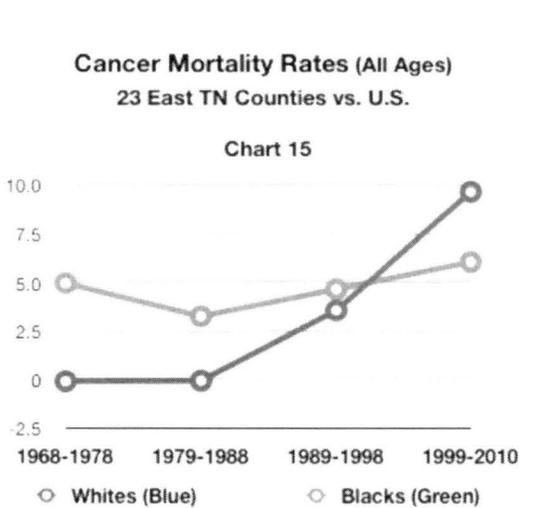
In the earlier study of seven counties surrounding Browns Ferry and in the current studies of 23 counties near three nuclear reactor facilities in Tennessee, they are seeing a classic “bathtub pattern” of infant mortality. In the seven proximate/downwind Browns Ferry counties, they found infant deaths rose in the first decade after the three GE Mark I Boiling Water Reactors (BWRs) began producing radioactive waste, then the rates seemed to settle into rates more aligned with the U.S. rates, even going below the national rates (during shutdown periods) until the three reactors began to age. The infant mortality rates surrounding Browns Ferry rose to 21.6% above the U.S. rate by 2010, a steady increase from the early 1990s, when infant mortalities were below the U.S. rate (while the reactors were shut down). These excess infant death rates in the Browns Ferry area are even higher for Hispanics (40.3%) and for whites (32.6%).¹⁷

¹⁷ Joseph Mangano, MPH and Gretel Johnston, *Radioactive Emissions and Health Hazards Surrounding Browns Ferry Nuclear Power Plant in Alabama*, BEST/MATRR, June 4 2013, pgs. 12, 27-30. http://best-matrr.org/pdfs/AL_BFN_Report_2013-final-dig2.pdf

Infant Mortality 1968 to 2010
in 7 Browns Ferry Nuclear Power Plant Proximate/Downwind Counties
3 Browns Ferry Reactors Started Up 1973-1975 by 2004 they were - 30 years old



This current study of 23 counties located near nuclear plants in Tennessee also reveals a disturbing pattern of cancer rates rising over the last four decades; and a sad, precipitous rise in infant mortality rates. Of course there may be additional factors involved, and no one can say there is a direct causal relationship, since the data is not available to draw that conclusion, but these patterns deserve further study; and, given the extreme mortality rates and health issues surrounding multiple plants and the number of aging reactors in the area, these patterns are worthy of note when discussing limits to effluent radionuclide contaminants in our environment.



Based on CDC data

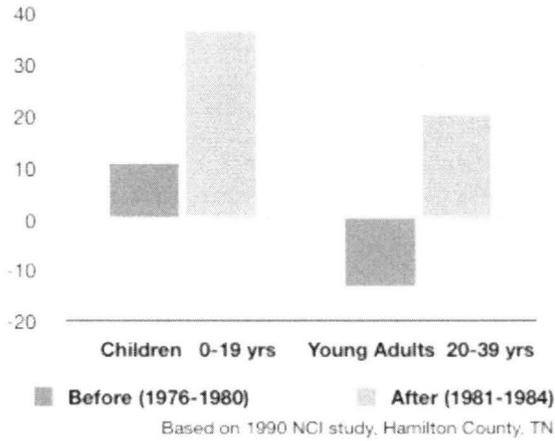
23 TN Cos.	1968-1978	1979-1988	1989-1998	1999-2010
Whites	-6.20%	-2.60%	+3.6%	+9.7%
Blacks	-5%	+3.3%	+4.7%	+6.1%



Based on CDC data

23 TN Cos.	1968-1978	1979-1988	1989-1998	1999-2010
Whites	-11.2%	+1.9%	+3.6%	+15.5%
Blacks	+0.1%	-15.1%	-14.5%	+10.5%

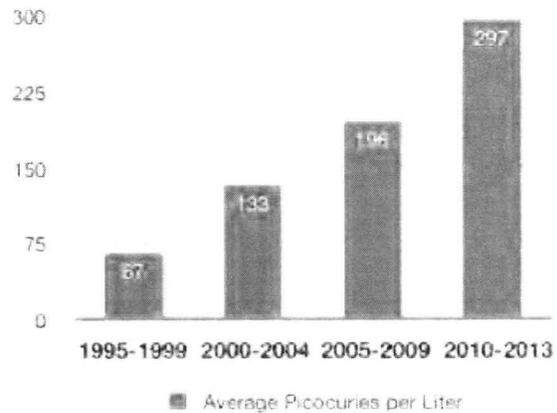
Cancer Death Rates - Before and After Sequoyah Nuclear Plant



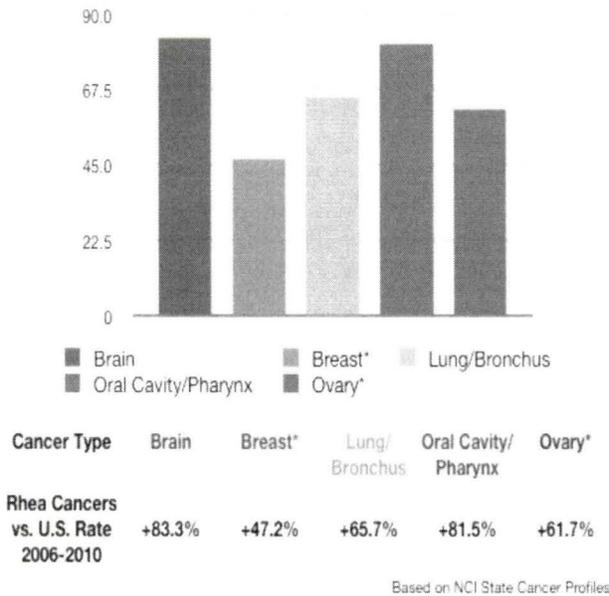
Following the start-up of the reactors at the Sequoyah Nuclear Power Plant (SQN), cancer death rates in Hamilton County, TN, rose dramatically among young people. The population very near the Sequoyah Nuclear Plant has increased in the last two decades, and the population within 50 miles is well over one million.

The city of Chattanooga is only 17 miles downstream of SQN, and the un-filterable tritium, which bonds with water to become tritiated or H3 radioactive water, has been rising steadily in Chattanooga's drinking water over the last two decades.

Tritium in Chattanooga Drinking Water



Rhea County, TN Cancers vs. U.S. Rates



Up river, in Rhea County, which is near both the Watts Bar Nuclear Power Plant and the Oak Ridge Nuclear Reservation, they found the highest cancer rates in Tennessee, the highest cancer rates for all U.S. counties with populations over 24,000, and the 19th highest cancer rates of all 2,727 U.S. counties that report to the National Cancer Institutes (NCI). As you can see, the brain cancer rate is 83%, breast cancer 47%, lung 66% higher, oral or pharynx 61%, and ovary cancer is 62% higher than the overall U.S. rates

(Note: These five Tennessee study charts will appear in a forthcoming BEST/MATRR publication, *Radioactive Pollution and Health Risks near Nuclear Plants in Tennessee*.¹⁸)

¹⁸ Joseph Mangano, MPH, Garry Morgan, Gretel Johnston, *Radioactive Pollution and Health Risks near Nuclear Plants in Tennessee*, BEST/MATRR, forthcoming publication.

Averaging effluent release levels is an inaccurate and possibly hazardous assessment of actual dose exposures for the public. BEST/MATRR has found, from real-time monitoring near nuclear power plants in the Tennessee Valley, that exposures are sometimes 40 to 50 times higher than background radiation levels, even at a distance of 70 miles from the plant, depending on weather conditions and possibly other factors.¹⁹

You cannot regulate exposure levels, if you do not know what those levels actually are at any given time. In the papers, "Make Radiation Visible,"²⁰ (presented to NRC Commissioners, January 2014), and "Monitoring Matters,"²¹ the authors proposed (1) real-time monitoring posted on licensees' websites, along with (2) release dates (3) and scheduled refueling dates, (4) all made available to the public online. They are asking that the public be informed of existing current levels of ambient radioactivity, scheduled refueling time periods, and effluent release dates. In addition, a suggestion was made for effluents protection in the case of an emergency release, whereby the public and first responders would be alerted to the plume flow direction by the simple release of a dye.

I applaud the proposed use of dose models for different age groups; however, must again point out that dose models are based on the fundamental data available for analysis. I suggest that your basis data is flawed and incomplete, if it is not truly comprehensive, and that effluents data can and should be gathered in real-time. I suggest that the "effective dose" cannot be calculated without real-time monitoring data and biological measurements

Since the radiation dose limits are tied to the effluent limits, it is appropriate to quote the Nuclear Information Resource Service (NIRS) 20-group comments submitted to you earlier this year regarding another Proposed Rulemaking on Radiation Protection:

"The NAS Biological Effects of Ionizing Radiation Studies (BEIR) V found radiation ~3-4 times more dangerous per unit dose than previously assumed and BEIR VII found cancer incidence risks 35% higher than BEIR V(1.141 x 10e-3 per rem). The European Commission on Radiation Risk2 (ECRR) report came out in 2003 enumerating the many ways the International Commission on Radiological Protection (ICRP, in which NRC plays a leadership role) underestimates and incorrectly calculates radiation risks including inappropriately using external dose information to extrapolate internal dose risk estimates without scientific foundation. The ECRR recommends "the total maximum permissible dose to members of the public arising from all human practices should not be more than 0.1mSv [10 mr], with a value of 5 mSv [500mr] for nuclear workers."²² It appears NRC has

¹⁹ Ibid, Mangano and Johnston, 2013, pg. 22. http://best-matrr.org/pdfs/AL_BFN_Report_2013-final-dig2.pdf

²⁰ Gretel Johnston, "Make Radiation Visible – Whitepaper," January 2014, <http://best-matrr.org/MakeRadiationVisible-WhitePaper.pdf>

²¹ Susan Shapiro and Gretel Johnston, "Monitoring Matters," March 2014. http://best-matrr.org/MONITORING_MATTERS-g3.pdf

²² "2003 Recommendations of the ECRR, The Health Effects of Ionising Radiation Exposure at Low Dosed for Radiation Protection Purposes, Regulators' Edition," Published on behalf of the *European*

not addressed these recommendations in any way. In addition, concepts such as the bystander effect and genomic instability have shown that mechanisms for harm exist that are not reflected in the ICRP models. Unfortunately our organization(s) was (were) not invited to the NRC meeting(s) on the radiation risk aspects of the rulemaking. " ²³

In response to your ANPR for Radioactive Effluents, I submit these current comments as an individual and in support of the Multi-Group Comments on Reactor Effluents that will be submitted by me on behalf of several organizations, calling for comprehensive real-time monitoring posted online, as well as refueling and effluent release schedules, to ensure the public is both informed and protected from ionizing radiation exposures.

Radioactive contaminants are extremely complex, since they often transform into progenies in their attempts to stabilize; however, this does not diminish the health hazard posed by even the smallest of exposures to ionizing radionuclides. Science has repeatedly shown us that radionuclides can damage human cells and break both strands of the DNA chain in even the smallest known dosages. And multiple studies have shown that young children suffer an increased risk of leukemia near the plants. If the Radioactive Effluents release limits are to be changed at all, they should certainly be reduced to protect the public, not increased to protect nuclear industry financial profits.

The proposals – to post real-time monitoring online, as well as refueling and effluent release schedules – are fairly simple and inexpensive measures that I request the NRC add to any Radioactive Effluents Rulemaking.

Thank you for your careful consideration of these proposals, and for your work to protect the people and the environment that sustains us all.

Respectfully submitted as an individual member of the public,

Gretel Elizabeth Johnston
PO Box 158
Scottsboro, AL 35768

Committee on Radiation Risk, Comite European sur le Risque de l'Irradiation, Green Audit, Brussels, 2003 (ISBN: 1 897761 24 4)

²³ Nuclear Information Resource Service (NIRS), "Comments of Nuclear Information and Resource Service et al, June 24, 2014, on Nuclear Regulatory Commission (NRC) 10 CFR 20, [NRC-2009-0279] RIN 3150-AJ29 Radiation Protection, Advanced Notice of Proposed Rulemaking on development of a draft regulatory basis. 79 FR 143: 43284-43300 7/24/14," submitted to Rulemaking.Comments@nrc.gov, June 24, 2015, pg 3.