

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

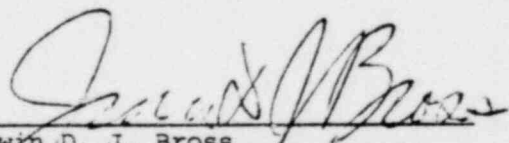
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
HOUSTON LIGHTING & POWER) Docket No. 50-466
COMPANY)
)
(Allens Creek Nuclear)
Generating Station, Unit)
No. 1))

AFFIDAVIT OF IRWIN D. J. BROSS

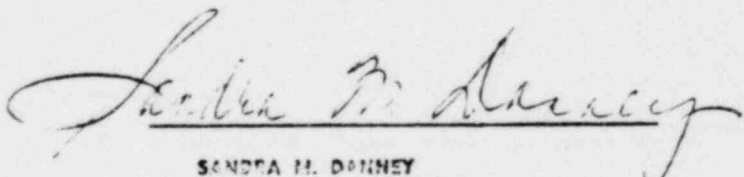
Buffalo, New York

I, Irwin D.J. Bross, of lawful age, being first duly sworn, upon my oath certify that I have reviewed and am thoroughly familiar with the statements contained in the attached affidavit answering Reginald L. Gotchy's affidavit of March 1981 and that all statements contained therein are true and correct to the best of my knowledge and belief.



Irwin D. J. Bross

Subscribed and sworn to before me this 7th day of April, 1981.



SANDRA M. DONNEY
Notary Public, State of New York
Qualified in Erie County
My Commission Expires March 30, 1983

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AFFIDAVIT OF IRWIN D.J. BROSS IN RESPONSE TO
AN AFFIDAVIT OF REGINALD L. GOTCHY (MARCH 1981)

In responding to the affidavit of Dr. Reginald L. Gotchy, there are three main points that can be made and for details on these points, my testimony on Docket No. A-79-46 (included as Attachment A of this affidavit) can be consulted.

The three main points in the Gotchy affidavit are incompetent, immaterial, and irrelevant. They are:

(1) The assertion that the NIOSH study found "no correlation between cancer or blood diseases and radiation exposure" was discussed in detail at a March 17, 1981 meeting of the scientific advisory committee. Of the five members present only Dr. Hamilton maintained this view (which is flatly contradicted by the actual CDC/NIOSH PNS data). The majority found evidence of an increasing trend with increasing dosage. The actual situation with respect to the PNS data is discussed in my previous response to Dr. Hamilton and in Docket No. A-19-46 testimony attached (Attachment A).

(2) The use of vague correlations of state leukemia rates with average elevation is a good example of outdated methods and arguments used in the official reports. This kind of information is scientifically irrelevant when PNS and other biostatistical-epidemiological data on individual human exposures is available (see Table A of Attachment A). This whole argument was refuted in detail in my letter to Health Physics (reference number 44 in my 1981 reassessment). This is Attachment B.

(3) Finally, it is argued that even if the estimates in the "1981 reassessment" are correct and risks are 20 times higher than the official estimates, this would not affect the cost-benefit calculations appreciably. As is pointed out in the "1981 reassessment" leukemia is our best early warning indicator and often predicts what will happen with solid tumors such as lung cancer. Indeed, as noted in Attachment A, the PNS data now show a doubled risk for lung cancer with the NRC ALARA exposures and lung cancer is the commonest male cancer. Moreover, the PNS data now shows increased risks for causes of death other than cancer and strongly suggests a broad spectrum of health effects from low-level radiation. Hence, the increased risk of cancer and other premature mortality is much greater than 0.2%. When the evidence now shows doubled risks for a number of different causes in workers exposed to NRC-ALARA dosages, the entire cost-benefit picture is drastically changed and must be recalculated with the proper use of the new risk estimates.

Since the actual PNS facts which Dr. Gotchy refers to are very different from what he is saying about them, they should be presented at any fair hearing. It would be a serious legal error to dismiss them summarily.

TESTIMONY ON RADIATION PROTECTION
GUIDANCE FOR OCCUPATIONAL EXPOSURES

Docket No. A-79-46

April 20, 1981

Testimony of:

Dr. Irwin D.J. Bross
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(716-845-5835)

PREAMBLE

At the suggestion of Mr. Luis Garcia, I am submitting the following written testimony on the proposed federal radiation protection guidance for occupational exposures with reference to Docket No. A-79-46.

The purpose of this testimony is to provide a basis for future legal challenge of any regulatory decisions based upon or derived from the proposed guidance.

I testify as an individual and for no institution or organization. As a public health scientist and biostatistician-epidemiologist for more than 30 years, I have published more than 300 papers and my latest book, SCIENTIFIC STRATEGIES TO SAVE YOUR LIFE (just published by Dekker), deals in detail with studies of the hazards of low-level ionizing radiation. For more than 20 years, I have been Director of Biostatistics at Roswell Park Memorial Institute for Cancer Research in Buffalo, New York (for 7 years as Acting Chief of Epidemiology) and before that was at Cornell University Medical College and Johns Hopkins.

THREE CONTENTIONS

Three main contentions will be presented and the remainder of the testimony will provide scientific and historical facts that will establish these contentions. The contentions are:

(1) There is now extensive biostatistical-epidemiological evidence that the doses of low-level ionizing radiation currently permitted by the Nuclear Regulatory Commission (NRC) cause at least a doubling of the risks of leukemia, lung cancer, and other fatal and non-fatal diseases. The dosages currently permitted in normal operations of

nuclear installations are dangerous to the health and safety of nuclear workers.

(2) The scientific evidence has been deliberately and systematically suppressed by the federal agencies in the interagency task force on radiation hazards. In particular, what is probably the best factual scientific evidence currently available has recently (March 17, 1981) been concealed from the general public and from Congress by the National Institute of Occupational Safety and Health. The incompetence, mismanagement, and malfeasance of the federal agencies that are involved in interagency actions on radiation hazards (including the actions published in the Federal Register for January 23, 1981) should preclude them from any participation in public health actions.

(3) The above-mentioned Register does not recommend or mention any guidance that would appreciably improve the protection of the health and safety of radiation workers. Genuine protection would require the use of the best available scientific evidence, particularly the evidence on nuclear submarine workers at the Portsmouth Naval Shipyard which has been suppressed by NIOSH. There will be no real protection of radiation workers until public health guidelines are set by the use of scientific principles and procedures, the best available evidence, and competent scientists who are not in federal agencies or in research organizations that do the bidding of these agencies.

Until there is a genuine scientific and public health effort, the objectives of the January 23, 1981 Register item are a fraud, the procedures a charade, and the whole thing a waste of time and taxpayer dollars that should be stopped immediately.

THE CDC/NIOSH COVER-UP

Turning now to the testimony and documentary evidence to establish the three contentions, I can speak as an original member of the scientific advisory committee named by Congress for oversight of the Center for Disease Control/National Institute of Occupational Safety and Health (CDC/NIOSH) follow-up study of the nuclear workers at the Portsmouth Naval Shipyard (PNS). CDC/NIOSH had been given a specific Congressional mandate to confirm or deny the 1978 report by Najarian and Colton of excess leukemia and cancer among the nuclear shipyard workers.

(1) In the 31 January 1981 issue of The Lancet the final CDC/NIOSH conclusion was:

"Finally in PNS radiation workers, we found no positive dosage response relationships between ionizing radiation dose and mortality from any cause reported."

At the March 17, 1981 meeting of the advisory committee the reason for this conclusion came to light: At the time when the report was submitted CDC/NIOSH had not carried out a single statistical analysis of the dosage-response relationship for any cause of death.

At this meeting CDC/NIOSH admitted that, after actually doing some analysis of their own data; they had found positive relationships between ionizing radiation dose and mortality from a number of different causes of death.

(2) In my January 26, 1981 memo to the committee and CDC/NIOSH (Attachment A) I had pointed out a strong relationship to lung cancer and there are relationships ranging from iffy to moderately strong for various other causes of death. Clearly, NIOSH had published a false

report in the scientific literature, a report that was flatly contradicted by the actual data in the PNS study.

(3) The circumstances leading up to the publication of this false report on the nuclear shipyard workers by CDC/NIOSH suggest that the agency intended to support the interagency position on radiation hazards irrespective of what was in its own data.

(a) The advisory committee did not see (or even hear of) the article CDC/NIOSH submitted to The Lancet until it was in print.

(b) The advisory committee was not given the key data tables (dose x latency) for most causes of death (including obvious causes such as lung cancer). The original version of the final report and the published version only included tables for leukemia and a few related causes. The committee was denied access to the data until after the fact because NIOSH claimed there were "too many" tables and "nothing" in them.

(c) The Lancet article was submitted despite repeated objections from myself and other members of the advisory committee to an earlier version of the final report. Months earlier I had stated in no uncertain terms that the so-called "final report" was inadequate and incompetent and had no statistical analysis of dose-response relationships.

(4) Thus, NIOSH withheld information from (and refused to listen to) the oversight committee that Congress had set up in 1978 specifically to avoid this kind of cover-up.

These historical facts make it difficult to avoid the conclusion that CDC/NIOSH published predetermined results (supporting the interagency position on radiation hazards) even though it meant lying to the public and to Congress about the results of the PNS study.

IMPORTANCE OF THE PNS STUDY

While it is not possible here to present the important scientific findings that come out of a competent biostatistical analysis of the dose-response relationships in the CDC/NIOSH data from PNS, this data is of crucial importance in setting future guidelines to protect workers. It is probably the best available data on what happens to nuclear workers under normal operating conditions and current NRC/ALARA permissible levels. This point is amplified in Table A.

What any adequate analysis of the PNS data will show is that exposures well under the 5 rem/year level (most workers had less than 10 rem lifetime exposure) caused at least doubled risks of death from lung cancer, leukemia, and a number of other causes. Hence, the levels of radiation exposure currently permitted are clearly causing serious health hazards to workers.

TABLE A

COMPARISON OF THE NEW DATA ON THE PORTSMOUTH SHIPYARD WORKERS WITH
THE DATA USED IN OFFICIAL REPORTS (INTERAGENCY, BEIR, ICRP, ETC.)

CHARACTERISTICS OF THE DATA	PNS DATA	OFFICIAL REPORTS
Who are the persons under study?	Nuclear workers under normal working conditions.	Survivors of an A-bomb or persons with grave disease requiring therapeutic x-ray.
What are the dosages of ionizing radiation?	Low-level radiation directly pertinent to occupational exposure standards.	Dosages in most subjects of well over 100 rem.
What is the quality of the dosimetry for persons under study?	Continuous concurrent monitoring of the exposures with recording of dates, doses, etc., for each individual.	Retrospective guesstimates of exposures with no adequate crosschecks or control of the dosimetry.
What is the quality of the follow-up of the persons under study?	Virtually complete (98%) with full death certificate and other information.	Incomplete and often inadequate follow-up and poor quality of information on individuals.
What was the quality of the information used for comparisons?	Nosology review enabled use of age-sex-race-cause specific U.S. rates.	Pick-up or biased comparison series (e.g., In some A-bomb comparisons, persons exposed up to 10 rem are used as controls).
What assumptions were necessary for estimates of doubling dose or other quantitative measures of health effects?	Estimates can be made directly without any strong assumptions.	Estimates require assumption of dubious "linear" or other hypotheses and are merely guesswork.
What was the quality of the statistical analysis used for the determination of dose-response relationships?	NIOSH failed to do any statistical analysis of dose-response in the "final report".	Most of the dose-response statistical analyses are inadequate or incompetent.

OTHER SCIENTIFIC EVIDENCE OF LOW-LEVEL HAZARDS

While the PNS data is especially pertinent, there are now extensive data from a large number of studies which are relevant to the setting of guidelines to protect workers. A review of the studies where populations actually exposed to low-level radiation showed serious adverse health effects (more than 30 such biostatistical-epidemiological studies by many different authors) is attached (Attachment B--material submitted for publication elsewhere).

For setting permissible levels of exposure to low-level ionizing radiation, it is essential to obtain quantitative estimates of risk such as "doubling doses". In 1978 at a special NRC meeting for this specific purpose, I presented the first accurate estimate of the doubling dose for myeloid leukemia in men. This estimate, based on an analysis of exposures to diagnostic x-rays in the Tri-State Survey data, was about 5 rem--thus showing that NRC permissible levels were hazardous. Whenever the doubling dose for leukemia can be estimated from more recent data, this 5 rem estimate has been confirmed. The PNS data confirms it. The CDC study of veterans exposed to the nuclear weapons tests at Big Smoky (which was published after Attachment B was written) also confirms this 5 rem estimate.

The purpose and quality of the official reports on low-level radiation hazards can be judged from this simple fact: While these reports mentioned and disparaged the positive studies cited above, none made estimates of doubling doses or other quantitative estimates from the data they were supposed to be evaluating. All of the recent reports (such as the Libassi Report (Interagency), the new BEIR report, and the

GAO Report on January 2, 1981) include attacks on the new positive studies--often attacks on the honesty, competence, and reputations of the independent scientists doing the studies--but they make no attempt to utilize the new information in a constructive way. Instead, they rely on the obsolete estimates and data described in Table A.

OVERALL VIEW

For the past 25 years, the federal agencies have been committed to the official policy laid down in 1955 by the Eisenhower Administration that low-level ionizing radiation is "harmless". At the 1978 House hearings reported in Serial No. 95-179 the participation of the Department of Energy, National Cancer Institute, and Atomic Energy Commission in this long-standing cover-up of radiation hazards is detailed. In SCIENTIFIC STRATEGIES TO SAVE YOUR LIFE (Dekker, 1981) the participation of other agencies including the Nuclear Regulatory Commission, Defense Nuclear Agency, and Veterans Administration is described. Therefore, the CDC/NIOSH cover-up of the serious radiation hazards at PNS should be viewed as one more attempt to maintain the official interagency position despite overwhelming new evidence that it no longer has any scientific or public health validity.

The maintenance of the myth that low-level radiation is "harmless" has endangered the public health and safety for 25 years and has resulted in thousands of unnecessary deaths and disabilities to workers the public, casualties that could have been prevented by more careful and sensible use of radiation technologies. The "harmless" myth has

been maintained by a combination of incompetence, mismanagement, malfeasance, and fraud in the federal agencies and interagency panels. Hence, it should be clear that effective guidance on radiation protection cannot be expected from federally controlled-and-funded units.

The best hope of setting guidelines that will actually protect workers and the public is to have competent people apply modern scientific and public health principles and procedures to the best factual evidence currently available. This is how to determine levels of exposure that will not jeopardize the health and safety of human beings. It would then be up to the managers of radiation technologies to operate within these limits or not to operate at all. In special circumstances (e.g., national defense) workers might be given the option of working at higher levels if they get hazard pay, guaranteed medical care, and adequate compensation for radiogenic health effects.

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No opinions here expressed should be construed as reflecting official positions of the administration of
Roswell Park Memorial Institute or of the N.Y. State Health Department.

May 23, 1980

H. Wade Patterson
Editor-in-Chief
HEALTH PHYSICS
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Dear Dr. Patterson:

Whenever I report on the new scientific studies (1) showing doubling doses for leukemia between 3 and 5 rem, I am likely to get the question: But doesn't this contradict the facts about background radiation and the vital statistics on leukemia? My answer is: No, there is no contradiction from the facts. The contradictions arise from the tacit assumptions used in the calculations.

One short letter cannot resolve all the confusions about background radiation so let me focus on the linguistic difficulties involving the term "background". If, as in the Cohen letter (2,3), this is considered to be cosmic rays then it will be true that the persons in the Western states with higher elevations will have "background exposure" greater than the "average USA resident". However, with vital statistics we are dealing with "background exposures" in a broader public health sense that also includes exposures to man-made radiation and to toxic

chemicals that cause leukemia. The generally lower Western death rates suggest that factors such as better air and water quality might more than compensate for altitude and the overall exposure may not necessarily be higher than average.

The tacit assumption here (i.e., that natural background is the dominant factor in producing leukemia) is contradicted in the recent Interagency Report (4): "...current assumptions predict that only about 1 percent of all cancers results from background radiation." Ironically enough, this extreme opposite assumption can also be used to "contradict" our doubling dose estimates: "...to accommodate doubling dose values in the range of 10 rem, this prediction would have to be greatly increased, perhaps to as high as 50-70 percent...(and)...such an estimate seems unreasonable" (4).

As these two extreme assumptions (3,4) might suggest, there is no very precise estimate of the contribution of natural background radiation to the leukemia rates although this is a critical quantity in the calculations and arguments. A rough estimate can be obtained from the common rule-of-thumb in vital statistics that the leukemia risks double with each decade of age (after age 30). If natural background is taken at 100 millirem per year and if our doubling dose estimate (say, 4 rem) is about right, then the natural radiation would contribute about 25% of the overall background exposure. Incidentally, the apparent discrepancy between a 4 rem estimate of doubling dose and the official estimate of

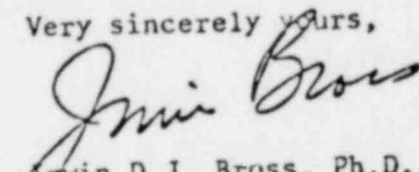
970 millirem average exposure at Big Smoky (which produced a doubled risk there) is due, I believe, to a substantial underestimate of the actual exposure.

With a 25% contribution from natural background, there is no contradiction in the negative results of Frigerio et al (3). The 25% allows ample scope for compensating factors (which were not considered) and also implies that the altitude effects would tend to get diluted out in the routine vital statistics used here. On the other hand, a 25% estimate suggests that assuming a 1% contribution from background radiation to leukemia is what is "unreasonable" and there is no real contradiction in the Interagency Report either. Once the tacit assumptions are clearly brought out, the contradictions disappear.

1. Bross, I.D.J. U.S. Civilian Casualties of Cold War Radiation Weapons and Myths: Must There be Another Million? Testimony to the Senate Government Affairs Subcommittee on Energy, Nuclear Proliferation, and Federal Services, March 6, 1970.
2. Cohen, J.L. Letter to the Editor. Health Physics, May 9, 1980.
3. Frigerio, N.A., Echerman, K.E., and Stowe, R.S. (Sept. 1973): Carcinogenic and Genetic Hazard from Background Radiation, Environmental Statement Project, Argonne National Laboratory, Argonne, IL, Report ANL/ES-26.

4. Biological Effects of Ionizing Radiation. Report of the Science Work Group of the Interagency Task Force on Ionizing Radiation. (Draft) February 20, 1979.

Very sincerely yours,



Irwin D.J. Bross, Ph.D.
Director of Biostatistics

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