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Appendix B: Dr. Najarian's Contentions (Portsmouth Shipyard)

T. Najarian and T. Colton "Mortality from Leukemia and Cancer In Shipyard Nuclear Workers" Lancet, 1, 1018 (May 13, 1978). Studying 1450 white male deaths among men who had worked at the Portsmouth shipyard (1959-1977), N-C observed a total of 366 cancer deaths in the 50-80 age bracket and considered this indicative of increased cancer mortality. Using vital statistics data for the Commonwealth of Massachusetts, I estimated a total of 373 cancer-deaths would be expected. There was no evidential basis for N-C contentions on excessive cancers among shipyard workers.

A more serious charge was made that leukemia deaths were excessive among PNS workers. N-C "found" 6 leukemia deaths among 146 "nuclear" workers. (The classification of "nuclear" or "exposed" was based on next-of-kin recall.) Using data published by the U.S. Naval Sea Systems Command, I estimate an average occupational shipyard exposure of 4 to 5 rem. Since each worker would by age 65 accumulate an off-site dose of 12 rem, the classification of nuclear was far from accurate. Nonetheless, the 146 workers would total about 650 man-rem or roughly 1 leukemia per 100 man-rem.

This is an incredible dose-response relationship. The total U.S. population exposure to natural and man-made radiation is about 40 million man-rem. This would mean an annual frequency of 400,000 leukemia deaths. The actual number is about 15,000 per year. I believe that N-C have made a misidentification of "nuclear" workers.

Apart from this point, N-C find about 18 leukemia deaths in 1450 deaths. In the New England area, I identified for the 50-80 year age bracket a total of 27 leukemia deaths among 2945 total deaths or 13.3 leukemia deaths for 1450 deaths. If one adjusts for the fact that the 13.3 number is for the general white male population it is not statistically too far from N-C's 18. In fact, one finds considerable variations in leukemia mortality among occupational classifications.

I conclude that the Najarian-Colton contentions about excessive leukemia and cancer mortality among naval shipyard workers are accurate.

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BOX No. 4 of 6
23 Mancuso Project (Mortality Data)
FOLDER #5 January 1979

Note: The above commentary includes data taken from a book THE RADIATION CONTROVERSY to be published in 1978 by Reddy Communications, Inc., 537 Steamboat Rd, Greenwich, Conn. 06830.

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is therefore not valid. The conclusion that I have made--that I have come to is that the standard for protection of the workers should be lowered--reduced at least ten fold and that there should be a corresponding reduction in the guidelines for protection of the public.

Comment:

Mancuso's proposal would drop the occupational limit to 0.5 rem/yr and the corresponding reduction for the general public would be from 0.5 rem/yr for an individual to 0.05 rem/yr; for the population it would drop from 0.17 rem/yr to 0.017 rem/yr which would rule out much medical x-ray diagnosis and much diagnosis with radioisotopes.

Now I would also like to make it clear that the hazards of radiation do not relate solely to cancer but that there are genetic effects and that it will take many generations to assess this danger. By the time they are able to assess it it will then be too late.

Comment:

This is clearly an overstatement of the issue since genetic effects would be only a fraction of somatic effects. The specific issue has been carefully treated by the BEIR report, i.e. the report of the National Academy of Sciences Committee on the Biological Effects of Ionizing Radiation.

Also all radiation is harmful. There is no safe level below which radiation is not harmful. Radiation at any level is harmful. Now, another point, that the potential problem relative to radioactive wastes and leakage of containers of radioactive wastes and of accidents is tremendous. Beyond the immediate site of radioactive waste or accident the contamination does exist relative to fuel, water and food.

Comment:

This reference is obscure since there are various types of radioactive wastes and of radioactive materials used in medicine. If Dr. Mancuso refers to high-level radwaste shipments, then he is in error since there have been no accidents involving population exposure. Similarly, low level radioactive shipments have not been subject to such accidents. Dr. Mancuso may have in mind the well publicized shipping accidents involving radioisotopes meant for radiodiagnosis. But the latter have not significance for the nuclear industry.

The realization therefore that the government has come to the conclusion in the technical studies that they have undertaken, that there there really has..their conclusion..the General Accounting Office.. that there is no technical means to control radioactive wastes which last 100,000 to 200,000 years.

Comment:

Apparently, the reference here is to a GAO report (EMD-77-41) "Nuclear Energy's Dilemma: Disposing of Hazardous Radioactive Waste Safely" in which there appears a finding that there is a "Lack of demonstrated technologies for the safe disposal of existing commercial and defense high level waste." This point was specifically contested by NRC and I wrote to NRC protesting the finding without citing the technical basis. The fact is that GAO does not engage in technical studies but rather in management reviews.

Now I would like to focus on the main theme of my particular presentation which relates to difficulties and obstacles in the conduct

of scientific investigations to get at the truth. You remember seeing on television--and it was very fortunate, indeed, that we had Congressional hearings relative to radiation--unless this was exposed to the public it would never have found out that the veterans were actually used as human guinea pigs in the nuclear weapons testing program.

Comment:

This is a curious assertion. A file check shows that since the early 1950's the Nevada tests were the subject of Page One news treatment. LIFE magazine featured photographs showing soldiers exposed to a radioactive environment.

That, in fact, an arbitrary decision had been made by the Army saying in effect that there shall not be any effects of low level radiation and therefore there was no medical surveillance or system to monitor or to follow up the veterans and a result ^{there are} between 300 to 400,000 veterans who are fighting desperately to get recognition relative to their exposure to radiation and to seek compensation which, unfortunately, has been denied them--by the Veterans Administration because of an

Comment:

The issue raised here is that of leukemia cases being found among soldiers who had been exposed or present at the Smoky shot in Nevada 20 years ago. A study is underway to determine if there is any unusual incidence of leukemia among these persons, i.e. statistically significant in relation to what one would expect for the specific population at risk. At the present time it does not appear that the leukemia incidence is statistically significant. Even if it were to be the case one would then have to consider environmental and occupational factors other than radiation.

obsolete claims system which says, in effect, that unless you get the symptoms while you are in service, they are not service-connected. Well, if cancer takes 10, 20 or 30 years later to develop, naturally the cancers are going to develop after the individual has left service. As a consequence all these poor veterans and their families are being denied, unfortunately and unjustly, their compensation.

Comment:

Dr. Mancuso has made a precipitous judgment without basis in scientific evidence that leukemia cases in the instance of Nevada tests are caused by Smoky radiation exposure. The awarding of compensation should be a matter of due process after a careful study of the situation has been made.

The other problem relative to the difficulties was encountered in the study of workers in nuclear shipyards. That was a study that was accomplished not by the Government, not by the Navy, not by the industry, but was accomplished by a courageous young doctor named Dr. Tom Najarian and by a group of investigative reporters by the Boston Globe newspaper. I hold them in high tribute because they had to overcome a great many obstacles in order to be able to ascertain what their their problem was. They got no help from anyone and there was a whole series of obstacles placed in their path.

Comment:

Dr. Mancuso does not define what these obstacles were unless he means that the Government did not supply Dr. Najarian with funds. Because of privacy restrictions the U.S. Navy was forbidden to turn over certain data to Dr. Najarian.

What they did was on their own--from worker to worker, from family to family--finally after studying about 100,000 death certificates they found out that there was a higher rate relative to leukemia for these workers who were exposed to radiation compared to the norm and also a higher rate for certain types of cancer compared to the general population.

Comment: Dr. Mancuso uncritically accepts Dr. Najarian's findings and persists in doing so even though they have not been published in an American professional journal. (They were published in a British journal, The Lancet 1, 1018, May 13, 1978 and were promptly refuted by distinguished British scientists--J.A. Reissland and G.W. Dolphin, Lancet, 1, 1156 May 27, 1978.)

The point I'm trying to make that this was a study initiated by a doctor who listened to ^{his} patient and who sought to intervene. It was not something that the government had decided--let us observe what is happening to the workers in a nuclear shipyard.

But that brings to back to a study that I undertook of the atomic workers. Now this is the problem that I am concerned with and I am only concerned with the truth and here about taking any particular position at all. My position only is to get the scientific truth relative to the effects of radiation and in particular low level ionizing radiation.

Comment:

It should be pointed out that Dr. Mancuso contradicts himself. Earlier, he already took a strong position in recommending a 10-fold reduction in radiation standards.

The Government came to me in 1964; I did not go to the Government. Representatives of the Atomic Energy Commission came to me in 1964 because I had been doing pioneer^{ing} work relative to the study of occupational cancer among industrial workers. They came to me to develop the methodology of how would you study workers in the Manhattan Project--the people who were involved in developing the atomic bomb.

Comment:

Dr. Mancuso's AEC contract ran from 1964 to 1977. Clearly, it would seem that the U.S. Government was deeply involved in seeking the truth about radiation effects. The record indicates no disagreement on Dr. Mancuso's part until 1976 or about a year before his contract was terminated.

How would you follow those individuals over several decades to find out what happened to them. So I beganth search for truth and I began in 1964 purely as a methodical (?) epidemiological study. But I want to tell you what happened to me so that you can understand the difficulties that occurred in this search for the truth. This will just take me two or three minutes to read it, but in order to read it--I have to read it--otherwise it would not be in proper context. In February 1978 the Congressional subcommittee on Health and Environment under Congressman Paul Rogers and ranking minority Tim Carter held congressional hearings on the major research studies on low level ionization. During these hearings the major focus on Feb. 8th and 9th was the Department of Energy's termination of the Mancuso

research contract on health effects of low level ionizing radiation. The Congressional hearings revealed that there was no justification for the termination of the contract--that the termination was not supported by the information provided. In contrast, the hearings brought out evidence of highly questionable activities by the Department of Energy employees, ^{as} serious mismanagement of research activities, absence of appropriate policies and procedures from the Department of Energy operations--and I'm quoting from the Congressional Record--Congressman Rogers concluded: "This is the most disordered, unstructured, mess I've looked into for some time." Dr. Liverman was instructed to

Comment:

I have observed Congressional hearings for 30 years and I have difficulty in recalling one in which science issues (and some scientists) were so abused. Witnesses like Mancuso and Dr. Stewart were fawned upon whereas Department of Energy scientists were treated harshly. The question as to whether the Mancuso contract was terminated improperly was investigated in an objective manner by the Inspector General (DOE). The Investigation Report 44-2-445 dated May 13, 1978 together with verbatim transcripts of interviews with key personnel (Exhibit D is a 42 page interview with Dr. Mancuso) does not disclose improprieties in the termination. It does reveal that the Mancuso contract, effective June 1, 1964 involved federal funds of \$1,857,662 plus support funds of \$4,525,000 or a total of \$6,382,662.

Page 1a of the Inspector General report sums up the evidence of John H. Thompson, director, sponsored project administration, University of Pittsburgh, "that after the University's legal staff reviewed the Department's action, involving termination, it was concluded to have been administratively proper."

submit to the Committee corrective actions, what actions you can take about the staff who misinformed you, what will you do about the Mancuso contract, and also your recommendation of whether there should be an in-house study on matters as sensitive as nuclear worker mortality. The report that was requested on February 9th to be available in ten days has yet to be submitted by the Department of Energy to the Congressional subcommittee now some eight months later. The Congressional Committee hearings brought out the following facts--that the Mancuso research study was transferred to the Oak Ridge Associated University by the Department of Energy when they concluded that that medical program was not conducive to this type of study--that they had weaknesses relative to human epidemiology--that the Department of Energy assigned the project without any request for protocol without requiring submittal of protocol. The most recent exposure of questionable practices carried out by the Department of Energy in the conduct of radiation health studies occurred recently when the Department of Energy gave..assigned.. or developed a project ^{with} the Johns Hopkins University for \$1.6 million

Comment:

Study of the Inspector General's investigation of the Mancuso study showed that as early as August 16, 1971 there is a record of dissatisfaction with the Mancuso study. On Jan.17, 1972 an internal AEC memorandum recommended that "the investi-

gators should be replaced" if there was no reasonable progress in 6 months. On Aug. 15, 1974 an AEC memorandum proposed final termination of the Mancuso contract. In March 1975 Dr. Mancuso was notified of the termination of his contract.

The Rogers subcommittee will have in print sometime in 1979 the full text of the Mancuso hearing. Copies may be obtained from the Committee on Interstate and Foreign Commerce, Subcommittee on Health and Environment, Washington, D.C. 20515.

and this project has not been concluded. It's just been developed so far and they advanced the inaccurate and misleading concept that the personnel in radiation in nuclear shipyards are better than the personnel and radiation records that they were maintained at the Hanford atomic facility. So what has happened, in effect, this is another move

Comment: I have been unable to find any source for this allegation. The Naval Sea Systems Command (Report NT-78-2 March 1978 "Occupational Radiation Exposure from U.S. Naval Nuclear Propulsion Plants and their Support Facilities") documents radiation exposure at shipyards and in the nuclear fleet, but no claim is made for superior records keeping.

by the Department of Energy to circumvent President Carter's memorandum to Secretary Califano to have health effects studies conducted in the health agencies, it is a move to delay and to confuse the public and to tell them, in effect, that we do not know the effects of low level ionizing radiation,, that we have to wait another 20 years to do this work. But this, of course, is not true.

Comment:

Dr. Mancuso here is referring to a May 9, 1978 memorandum from Stuart Eizenstat and Zbigniew Brzezinski to Joseph Califano to formulate a program including the following:

- "1. A study or series of studies which would determine the effects of radiation exposure on participants in nuclear tests, including members of the armed forces and civilian personnel, workers at nuclear facilities and projects, and other persons as indicated.
2. A public information program to inform persons who might have been affected and the general public about the steps being taken and the conduct of the studies.
3. A plan for ensuring that persons adversely affected by radiation exposure receive the care and benefits to which they may be or should be entitled.
4. Recommendations on steps which can be taken to reduce the incidence of adverse radiation exposure of this type in the future."

(Quoted from text of the memorandum).

It is believed that the DOE-Johns Hopkins study has already found that leukemia mortality among shipyard workers conforms to that for the general occupational population in specific geographic areas.

The person that assisted me in my particular work was Dr. Alice Stewart, a British scientist, who made the original discovery when she was at Oxford University. She discovered the fact that children born of mothers who were x-rayed during pregnancy had a higher risk

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of leukemia and other types of cancer. Dr. Alice Stewart conducted the technical analysis of my data and found that low level ionizing radiation much below the standard permitted for the industrial worker does cause cancer. We found cancer of the bone marrow, multiple myeloma, cancer of the pancreas and cancer of the lung.

Comment:

At this point Dr. Mancuso gives a highly abbreviated version of the Mancuso findings. He neglects to mention that the two investigators most closely associated with the work, Dr. Allen Brodsky and Dr. Barkev Sanders, are in complete disagreement with Dr. Stewart's handling of the data. She was signed on the project in July 1976 and on Sept. 22, 1976 Dr. Mancuso notified the government that he had indications of positive findings on radiation dose-response among Hanford workers. On Oct. 13, 1976 Dr. Stewart presented the results to a Health Physics Society meeting at Saratoga Springs, N.Y. Considering the mass of data and the number of uncertainties associated with it, this was a tour de force by Dr. Stewart of unprecedented magnitude, especially considering that the low level (about 2 rem) of cumulative occupational exposure.

Note: Appendix A includes discussion of salient points about the Mancuso-Stewart-Kneale contentions.

So, basically, as I see the situation, all we're interested in searching for the truth. I think it is improper for the study to have been terminated the way it was. I think it's improper for the public to be misled to think that we require another 20 years to find out the effects of low level ionizing radiation. But the significance of the findings now means that not only should the standards be revised relative to industrial workers--and I wish to correct the statement and put in proper perspective this idea about the nuclear industry. It is the safest, by far, because they can't afford to have an accident. But what has not been told over the past 20 years is the fact that the industry never knew what the long term biological effects were of workers in atomic energy, because no one had ever studied the workers who had separated from the plant and then who died 10, 20 and 30 years later. I was the one who did that study. No one had ..no other study had been done before that. Consequently the Government and ^{the} representatives of the Atomic Energy Commission have unfortunately presented only a half truth in representing the safety of the nuclear industry because since no study had ever been done of the long term delayed effects, particularly relative to cancer of atomic workers, there was no way for anyone to say that it was safe relative to the long term effects. Thank you.

Comment:

Dr. Mancuso's contention that the public is being misled and that 20 years will be required to find the radiation effects is without basis in fact. Similarly, his assertion that the nuclear industry did not know the long term biological risks for occupational radiation exposure is most misleading. By the same token, Dr. Mancuso could indict the medical profession whose annual unnecessary x-ray exposure is at least 7 million man-rem as against 30,000 man-rem for the nuclear reactor annual exposure--a factor of 233. Standards have been set on the basis of the linear hypothesis and are thus

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conservative. When Dr. Mancuso charges that the Government is guilty of half-truth in misrepresenting nuclear safety, he overlooks the fact that a mass of data have been studied (see the BEIR report) to arrive at estimates of low-level effects.

Dr, Mancuso's remark about the nuclear accident record is apparently a response to my remarks. I submit that the industry's record is impressive in that over 400 reactor-years of performance have been logged without even fuel-overheating in light water reactors. Since one would naturally expect "small" accidents to be much more frequent than "major" ones, just as fender-bending is more common than a motor vehicle fatal collision, this does provide some substantive data on reactor safety.

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Note: The following Appendix contains observations on the Mancuso-Stewart-Kneale (MSK) findings for Hanford atomic workers.

APPENDIX A

About 25,000 male workers were employed at Hanford between 1944 and 1971 for whom records exist. Death certificates of 3520 decedents were available for these men. Of these, 2184 were classified as "exposed", meaning that they accumulated a lifetime occupational dose of more than 0.01 rem. MSK found a 3756 man-rem exposure for these males, i.e. a mean occupational lifetime dose of 1.7 rem. The average white male will by age 65 accumulate a radiation dose of about 12 rem due to natural background and medical exposure. Thus MSK quest after an elusive effect in correlating cancer deaths since the on-site occupational lifetime dose is so small compared to the 12 rem total dose.

MSK analyzed 670 male deaths as due to cancer of which 442 were considered "exposed". Cancer mortality rates: 19.03% for total group, 20.23% for "exposed" group. The cancer data are displayed in terms of (O) observed to (E) expected mortalities both as the difference O-E and the ratio O/E, as a percentage. MSK (Table 24 in Health Physics 33,369 (1977)) finds:

Cancers (type)	O-E	O/E
Bone marrow	9.7	179%
Reticulo Endothelial System	11.1	121
Pancreas	6.0	114
<u>Lung</u>	<u>12.6</u>	<u>107</u>
<u>Total cancers</u>	<u>25.8</u>	<u>104</u>

The total listed is not the sum of the four specific cancers listed but includes all cancers, some of which were less than expected. The lung data should be considered here since no attempt was made to rule out smoking (1960 data were cited). Thus the whole MSK case rests upon a comparatively few cancers. More importantly, it depends very critically on how the (E) expected mortalities are estimated. Dr. Terence W. Anderson, professor of epidemiology at the University of Toronto ("Radiation Exposures of Hanford Workers-A Critique of the Mancuso, Stewart and Kneale Report" Health Physics, 35, in press (March, 1979) shows that MSK calculated their ratio "in a decidedly unconventional way, using as their denominator total U.S. deaths in 1960 including children and the very old, and have made no attempt to standardize to the age-distribution of the Hanford deaths."

Dr. C.E. Land ("Review of Mancuso, Stewart and Kneale: Radiation exposures of Hanford Workers dying from cancer and other causes" To be published 1978) has reanalysed the MSK data using accepted methodology and expresses serious doubt as to the statistical validity of the MSK data in terms of correlation with the low lifetime mean doses involved.

The MSK paper has also been critiqued by analysts S. Marks, E.S. Gilbert and B.D. Breitenstein "Cancer Mortality in Hanford Workers" International Symposium (IAEA) on the Late Biological Effects of Ionizing Radiation, Vienna (Mar.1978). Also E.S. Gilbert "Methods of Analyzing mortality of workers exposed to low levels of ionizing radiation." BNWL-SA-6341 (1977); E.S. Gilbert-Testimony given before the Rogers Subcommittee on Health and Environment, Feb.9,1978 (to be available in Committee print 1979). Critics observe that the radiation lifetime dose for certain cancers is highly skewed. Dr. Reissland (NRPB-R79) observes:

"Of the 11 men who died due to myeloma, 8 had received less than 1 rem from occupational exposures and the other 3 account for 98% of the dose, their doses being 35, 29 and 20 rem. Thus to attribute 9.7 deaths to be due to radiation-induced bone marrow cancers cannot be reasonable."

Leukemia is generally the disease most likely to be increased by exposure to ionizing radiation. Yet the MSK study shows an absence of leukemia. This is a telltale indicator that something is badly askew in the MSK analysis.

No attempt was made by MSK to take into account occupational risks other than radiation, such as exposure to asbestos and to other chemical carcinogens. Anyone dealing with statistics should be careful to avoid confusing correlation with causation. One can, for example, correlate the sale of ice cream cones with the number of drownings, but surely this is not causation and no one would argue that ice cream cones should be banned.

The total man-rem dose for 2184 "exposed" worker-deaths was 3756 man-rem; this involved according to MSK a total of 25.8 total 'excess' cancers, attributed to radiation. This would mean 6850 cancer-deaths per million man-rem or 34 times higher than the conservative figure of 200 cancer-deaths/million man-rem often assumed. I was struck with the possibility that such a pronounced radiation effect might show up in a limited sample of high exposures. With the cooperation of the Department of Energy I acquired follow-up data on AEC workers who had received 4,092 man-rem of dose in accidents from 1946-1971; most cases had a 20 year follow-up. If the MSK results applied to my sample of 33 workers, then almost all of them should have died due to cancer (allowance being made for the latency of cancer-induction). But follow up studies showed one lung carcinoma (a man who was a heavy smoker and a hard rock miner with a history of silicosis before joining the AEC) and one acute lymphocytic leukemia. It is interesting to note that workers receiving 200 to 400 rem lived for 20 to 30 years and died of heart attacks.

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