

# The legacy of Dr. Carl Johnson

D. M. Wood, Ph.D, wooddmav@gmail.com

## 1 Introduction

As noted in Dr. Katy Human's review of Kristen Iversen's *Full Body Burden* in the well-known British medical journal *The Lancet* [1], "Instead of citing the many well respected studies that tried—and failed—to find elevated levels of illness downwind, Iversen focuses on the charismatic character of Dr. Carl Johnson. . . Iversen's choice to focus on extreme and often unproven claims makes her brilliant voice less trustworthy."



In this brief document (which does *not* cover science directly but does correct obviously wrong statements) we examine his findings, his reputation, and his legacy. Described by others as an 'amateur epidemiologist', Johnson sprang into public attention in 1981 when he published an article in *Ambio* [2]. We consider three topics, (i) Johnson's record in Jefferson County, Colorado before his firing in 1981, (ii) professional assessment of his scientific findings, and (iii) his impact in Utah and professional assessment of *that* work.

## 2 Johnson's record in Jefferson County, Colorado

The account [left column below] at the [Denver Library](#) tracks his career and was clearly written by an admirer rather than an unbiased observer. It culminates with: "Update: In August of 2019, high levels of plutonium were found in the soil just outside the plant near 96th Avenue and Indiana Street. Further testing is ongoing." **There has been no plant since 2005; Pad 903 was at least 2 miles from the location specified, there are no citations to the literature or what might be meant by 'high levels'.** The court record of Johnson's firing [right column] tells a very different story than the Denver Library account. Readers should examine the [court accounts](#) from the Colorado Supreme Court case of 1983.

## Denver Public Library account

In 1975, local land owners were granted a \$9 million dollar settlement for contamination of their property. That same year, Dow Chemical was replaced by a company called Rockwell International which took over operation of the facility. Within a year, Dr. Johnson became aware of horses in the area that had been contaminated with radioactive thorium. **Thorium is the most common natural radioactive element, accounting for about 50% of soil radiation dose along the Front Range.** This led him to collect samples of soil near the plant to test for radioactive materials. The results of his study, completed in 1977, showed high levels of radioactive cesium to the east and west of the plant. **[<sup>137</sup>Cs is a fission byproduct, not from Rocky Flats. What were high levels? If Johnson data were reliable, little to no windblown contamination would be found west of the plant. Almost definitely from fallout-measured levels in Rocky Flats soil are higher than for Pu.]** His research also found that birth defects in Arvada (the part of Jefferson County near the facility) were twice as high as those in the rest of the county.

In 1978, Dr. Johnson released a new report showing that cancer rates were higher among Rocky Flats employees. It was also reported that the data released from Rocky Flats did not include all employee deaths and only included deaths of people who retired or died on the job. Rockwell International, the company running the plant, also suggested that there was no link between cancer and their employees handling plutonium. Johnson's research also showed that cancer rates among children had been below the normal level before Rocky Flats opened.

After the explosion at the site in 1957, however, cancer rates among children rose to twice the normal level.

By 1979, Dr. Johnson had come under more intense criticism from federal, state and local governments. He was preventing the construction of housing developments, such as Walnut Creek, near Rocky Flats and that meant fewer profits for construction companies and taxes for the government. The forces against Dr. Johnson continued to build and, in 1981, he was fired from his job at the health department. He sued Jefferson County and was awarded \$150,000, but what he really wanted was to have his job back.

## 1983 Colorado Supreme Court (verbatim)

Chairman Bebber [M.D.] related to the other members that Tipton [director of environmental health] had confided to him that the true reason for his [Tipton's] resignation was an inability to work and communicate with Johnson. Doris McCoy, who was also present, told the board members that her resignation was due to Johnson's lack of leadership and lack of support for her efforts. The board members were of the view that Bebber should tell Johnson to look for other employment. Bebber later met with Johnson and, according to Johnson, told him that the board members were insisting on his ouster due to his Rocky Flats studies.

On May 15 [1981] the full board met and again discussed Johnson. In executive session the board heard from Doris McCoy, the director of nursing, who described numerous problems she perceived in Johnson's administrative abilities. In her opinion he was a "one issue director" who had no real interest in or understanding of routine health department programs and concerns.

Johnson contended that the board action was generated by concerns that his studies would damage property values and development potential in the areas surrounding the Rocky Flats Plant and that the alleged administrative deficiencies were a mere pretext for his removal. He presented evidence that Bebber had at one time owned property near the Rocky Flats Plant and had repeatedly expressed concerns about maintaining the area's property values. Similarly, according to Johnson's testimony, board member Richard Newman voted to accept the resignation because Johnson had initiated an investigation by the United States Environmental Protection Agency of \*469 several plants located in the Rocky Flats Industrial Park including one in which Newman had an ownership interest.FN6 There was also evidence that the third board member voting for Johnson's ouster, Charles DeShazer, had only just taken office and had never met him.

## Denver Public Library (continued)

Even after leaving his job, Johnson's work seemed to grow in importance. After the government, business groups and even his colleagues tried to deny the strength of his work, he was greatly vindicated in 1984. That year, the American Medical Association published Dr. Johnson's study on the effects that Nevada nuclear bomb tests had on residents of southern Utah. Radioactive material had floated on the wind from the test sites into Utah and raised cancer rates. [The AMA article itself was completely discredited, as will be seen below.] In 1985, land owners near Rocky Flats filed lawsuits against Rocky Flats, Dow Chemical and Rockwell International. Rocky Flats and the companies settled the lawsuits by paying out \$9 million to landowners. Dr. Johnson's research had been crucial to the case.

Poor Dr. Johnson! The reality is that *all* of his findings about Rocky Flats were discredited by professional epidemiologists, and his anti-nuclear fervor accompanied him to Utah, where he published *more* alarming findings, which in their turn were discredited.

Jefferson County was prescient in firing him. The court account makes it clear that his employees thought he was a 'one issue director' with poor administrative and personnel skills. They testified that he spent most of his time on Rocky Flats related activities and radiation studies at the expense of his other responsibilities. He was an "alarmist who would immediately seize on any tentative health hazard and publicize it." It appears that *their resignations* led directly to Johnson's firing.

In his turn, Johnson charged two of his superiors with financial conflicts of interest (shown to be invalid by the court). Johnson himself, not his indignant supporters, was the author of the theory that he was fired because his studies would threaten property values and development.

In reading the court records Johnson comes across as a tendentious and litigious publicity seeker.

## Colorado Supreme Court verbatim (continued)

The trial court expressly found that Bebbler had sold his property in the Rocky Flats area prior to the actions of the board in April and May of 1981 and that, therefore, he did not labor under any conflict of interest in voting for Johnson's discharge.

The court found that Johnson's charge of conflict of interest against board member Newman was "created by [Johnson] at the meeting at the Environmental Protection Agency after he was advised that the Board intended to terminate his employment."

The board presented evidence questioning Johnson's administrative capabilities. Johnson's secretary, Genie Wood, testified that Johnson was away from the office approximately half of the time and that he had spent the majority of his time on Rocky Flats related activities. Doris McCoy testified to the complaints she made to the board at its April and May meetings as well as her general view that Johnson overemphasized radiation studies at the cost of other health department functions. Dan Tipton, the former director of the environmental division of the department, expressed a similar sentiment. In his view Johnson's style was that of an "alarmist" who would immediately seize on any tentative health hazard and publicize it. This trait, according to Tipton, resulted in distrust on the part of other state agencies which normally were consulted about potential health hazards before the hazards were publicized, and also resulted in low employee morale because of Johnson's apparent lack of concern for day to day activities.

In fact, the Colorado Supreme Court sent the case back to the Jefferson County District Court, which was to determine whether Johnson's free speech rights permitted him to speak out officially. The legal impact that public employees who serve at the pleasure of an appointing board are protected against retaliation via First Amendment rights. This was the reason for the \$150,000 award.

### 3 *Scientific findings about Rocky Flats work of Dr. Carl Johnson*

The *scientific significance* of Johnson's results was assessed much more quickly than whether he was a 'whistleblower'. It is helpful to follow these in chronological order, as they are presented below.

1. *Misuse of statistics in the interpretation of data on low-level radiation*, Hamilton, L. D., Paper presented at 7th Symposium on Statistics and the Environment, October 4-5 (1982). [3]. "Inappropriate adjustment for age and ignoring differences between urban and rural areas leading to potentially spurious increase in incidence of cancer at Rocky Flats";  
 "Another interesting fact is that the associations found were randomly distributed at different ages for different diseases and at different doses. Moreover, they do not show any pattern of increased association with diseases that normally might be related to plutonium radiation exposure. . . . In conclusion, one can say that there is no substance to either Dr. Johnson's alleged increased total incidence of total cancer in the areas of increased plutonium or his statistically significant increase of observed cases over expected cases for some cancers at some ages."
2. "... epidemiologic studies of cancer in residents near Rocky Flats are not warranted due to the extremely low population exposure levels. The increment in population radiation exposure from Rocky Flats is far below that from natural background and from global fallout in that area. [4] [Dreyer, Loughlin, Fahey, Harley 1982]".
3. "Our estimate of the maximum 50-year alpha dose, assuming continuous inhalation of resuspended plutonium, was 0.3 mrad to the critical cells in the tracheobronchial tree and 1.8 mrad to cells on the bone surface, compared with 7000 mrad and 3000 mrad to these same sites from natural background. . . . [5] [Dreyer, Loughlin, Fahey, Harley 1983]
4. In Johnson's data, "The strongest statistical correlation found was between cancer incidence and proximity to the State Capitol Building. . . . The trends towards higher cancer incidences closer to the Rocky Flats plant that were observed [in analyses in Section III] were also reaffirmed. However, when the census tracts were stratified by distance from the State Capitol Building, the correlation of cancer incidence with proximity to Rocky Flats largely disappeared." [6, 7] [Crump, Ng, Cuddihy 1984, 1987]
5. "The results from other studies that examined the possible relationship between cancer incidence and plutonium exposure have

[A general decline in the observed/expected cancer ratio for 1969-71 and in all-cause age-, race-, and sex-adjusted mortality] "also sheds considerable doubt on Dr. Johnson's conclusions". Problems included "the obscurity of how Dr. Johnson standardized his mortality rates"; "This difference in the age distribution of the population between areas I and IV [control] throws considerable doubt on and could well negate the conclusions drawn by him".

. . . "To turn to his second claim—the consistently significant increase of observed cases over expected cases for some cancers at some ages as given in his Tables 4 and 5—one can calculate right away that there could be 346 possible statistical associations in both tables. Dr. Johnson found only 20 statistically significant associations out of 346 possibles. This number of associations would be expected by chance alone.

'stratified'—ordered by distance

not yielded consistent results. Johnson reported significantly elevated cancer incidence in the area surrounding Rocky Flats during 1969-70. On the other hand, a mortality study of 224 plutonium workers at Los Alamos Scientific Laboratory showed no excess deaths from any cause . . .

Sixteen additional maps, not shown, were made for leukemia cases age 35-54 (4 maps), lung cancer cases age 35-54 (6 maps), and lung cancer cases age 55 and older (6 maps). None of the 20 maps shows significant clustering of cancer cases in the vicinity of the Rocky Flats Facility. . . . No pattern seems to be associated with the distance to the Rocky Flats Facility. Only one of the 20 test statistics has a P-value in the neighborhood of 0.05, which is entirely consistent with chance variation as an explanation. . . . [8] [Selvin, Shaw, Schulman, and D. W. Merrill, 1987]

6. "We illustrate these methods with data from Denver and Jefferson counties in Colorado to investigate whether lung cancer and leukaemia incidence patterns appear to be associated with the Rocky Flats plant site. . . . We chose the following cancers for study because of their associations with radiation exposure: (i) lung, bronchus and trachea; (ii) leukaemia. . . . Visually, these cases do not appear to have a spatial association with the Rocky Flats plant site.

. . . It does not appear from these analyses that any association exists between cancer incidence and the Rocky Flats plant for the time period and cancer types investigated. We found no consistent positive findings and the number of significant p-values (4) is compatible with chance since we performed 60 tests." [9] [Schulman, Selvin, and Merrill, 1988].

7. From a 2017 report from the Colorado Department of Public Health and Environment [10],
  - The incidence of all cancers-combined for both adults and children was no different in the communities surrounding Rocky Flats than would be expected based on cancer rates in the remainder of the Metro Denver area for 1990-2014.
  - The incidence for six of the ten types of cancer evaluated was no different in the communities surrounding Rocky Flats than would be expected based on cancer rates in the remainder of the Metro Denver area for 1990-2014. The types of cancer not elevated were stomach, liver, bone, leukemias, lymphomas, and brain and central nervous system.
  - Nearly all of the significantly elevated cancer findings in this

"The disease data used to explore possible patterns associated with the Rocky Flats Facility were incident cancer cases recorded in the TNCS from 1969 through 1971. Two types of cancer often attributed to radiation exposure, lung cancer and leukemia, were chosen for analysis. . .

"The negative results in . . . Jefferson-Denver . . . relate to at least two possibilities: either a) no relation exists between disease and pollutant, or b) the analyses lacked sufficient power to detect any relationships that do exist. . . . The chance that these negative results arose because the analyses lacked statistical power, i.e., lacked sufficient numbers of observations, is [possible for Santa Clara County] but unlikely for Rocky Flats data. For example, even with a sample size as small as 15 cases, the probability of detecting a 30% decrease in the average distance from Rocky Flats is approximately 88%."

evaluation involved cancer types (lung, colorectal and esophagus) known for having smoking as a primary risk factor.

#### 4 *Johnson's post-firing impact in Utah*

1021 individual nuclear explosions (most underground) were conducted at the Nevada Test Site between 1952 and 1992, all fission-based (as triggers in the case of a small number of thermonuclear weapons). Unlike the handful of plutonium isotopes of interest at Rocky Flats, dozens of highly radioactive but short-lived (“fallout”) isotopes are produced by fission. The most highly radioactive (short half-life) are  $^{131}\text{I}$ ,  $^{140}\text{Ba}$ ,  $^{95}\text{Zr}$  and  $^{95}\text{Nb}$ , while the longest lasting are  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$ . NIST soil measurements showed higher levels of fallout  $^{137}\text{Cs}$  than Pu across Rocky Flats.  $^{131}\text{I}$ , like all iodine, has a special affinity for the thyroid gland, and its role was clarified in detail after the 1986 Chornobyl accident.

Carl Johnson's 1984 article *Cancer incidence in an area of radioactive fallout downwind from the Nevada Test Site* claimed [11] “The cancer incidence in a 1951 cohort (4,125) of Mormon families in southwestern Utah near the NTS was compared with that of all Utah Mormons (1967 through 1975). There were 109 more cases of cancer than expected (288[observed]/179[expected]). Leukemia was most prominent early (1958 through 1966), with 19 cases, five times more than expected (3.6). The excess of leukemia persisted into the later period (1972 through 1980), with 12 cases observed, 3.4 expected ... A subgroup with history of acute fallout effects had a higher cancer incidence. That these cases can be associated with radiation exposures is supported by a comparison between groups of the ratio of cancers of more radiosensitive organs with all other types of cancer.”

As noted by Miles [12], “ Dr. Ralph E. Lapp in reviewing the Johnson study writes: It's **no credit to JAMA that such a loose-jointed epidemiology got through peer review...** Finally, the National Cancer Institute (NCI) intervened. ... **the investigation found no evidence of excess cancer mortality. It turns out that Utah has the lowest cancer mortality of any of the 48 contiguous states.**”

Three authors from the American Cancer Institute had the last word. “There was no excess risk of cancer mortality in southwestern Utah, for single or grouped sites, with the single exception of leukemia which showed statistically significant odds ratios of 1.45 based on 62 deaths at all ages, and 2.84 based on nine deaths at ages 0–14 ... Mortality from all cancer sites combined was significantly lower in southwestern Utah than in the remainder of the state, even after adjustment for the higher proportion of (lower risk) Mormons in southwestern Utah. The present results, including the positive

Johnson also found, “There was an increase in lymphoma. Excess cases of thyroid cancer appeared early and a notable excess appeared later (14/1.7). An excess of breast cancer was noted later (27/14). There were more cancers of the gastrointestinal tract than expected. There was an excess of melanoma (12/4.5), bone cancer (8/0.7), and brain tumors (9/3.9).”

The book *Radioactive Clouds of Death over Utah: Downwinders' Fallout Cancer Epidemic Updated* by Dr. Daniel Miles (a retired physics professor who died in 2024) is available via Amazon for about \$4. There are no graphics or tables of data, but the narrative in many ways will be familiar to those living around Rocky Flats.

Dr. Lapp was a Manhattan Project scientist who strongly opposed nuclear weapons testing because of the dangers of fallout.

association for leukemia, are inconsistent with the high excess risks reported by Johnson (JAMA 1984;251:230-6) based on an interview survey of cancer incidence among long-term Mormon residents of southwestern Utah” [13].

## 5 *The Johnson legacy*

It seems fair to say the Dr. Carl Johnson left a trail of anxiety about radiation-induced cancers that simply failed to materialize either around Rocky Flats, Colorado or downwind of the Nevada Test Site. Nonetheless, an AI retrospective notes that Johnson

An earlier version of the Miles book had the subtitle *Downwinders deluded and waiting for death*.

- Brought public attention to off-site plutonium contamination when most official agencies were minimizing concerns
- Pushed for greater transparency from federal agencies and contractors
- Framed Rocky Flats as a public-health issue rather than solely an engineering or regulatory issue
- Helped legitimize concerns of Nevada and Utah downwind communities and paved the way for the Radiation Exposure Compensation Act in some cases.

**See the bibliography** for citations of all of the epidemiology on Rocky Flats. There are **no** findings of elevated illnesses among the public as of 2026.

## *References*

- [1] Katy Human. “Full Body Burden (book review)”. In: *The Lancet Oncology* 13.December (2012), pp. 1199–1200.
- [2] C. J. Johnson. “Cancer incidence in an area contaminated with radionuclides near a nuclear installation”. In: *Ambio* 10.4 (1981), pp. 176–182. ISSN: 00447447. DOI: 10.2307/4312671. URL: <https://www.jstor.org/stable/4312671>.
- [3] L. D. Hamilton. “Misuse of statistics in the interpretation of data on low-level radiation”. In: *Seventh Symposium on Statistics and the Environmental*. 1982. URL: <https://inis.iaea.org/records/65vkn-n3w85/files/14786900.pdf>.
- [4] N. A. Dreyer et al. “Feasibility of epidemiologic studies of cancer in residents near the Rocky Flats Plant”. In: *Health Physics* 42 (1982), pp. 65–68.

- [5] Nancy A. Dreyer and Naomi H. Harley. "Response to Johnson by Dreyer and Harley". In: *American Journal of Public Health* 73.5 (1983), pp. 599–600. ISSN: 0090-0036. DOI: [10.2105/ajph.73.5.599](https://doi.org/10.2105/ajph.73.5.599).
- [6] Kenny S Crump, Tie-Hua Ng, and Richard G Cuddihy. *Statistical analyses of cancer incidence patterns in the Denver Metropolitan area in relation to the Rocky Flats plant*. Tech. rep. Albuquerque, NM: Inhalation Toxicology Research Institute, Lovelace Biomedical and Environmental Research Institute, 1984. URL: [https://www.researchgate.net/profile/Tie-Hua-Ng/publication/19569706\\_Cancer\\_incidence\\_patterns\\_in\\_the\\_Denver\\_metropolitan\\_area\\_in\\_relation\\_to\\_the\\_Rocky\\_Flats\\_plant/links/0a85e53a424be9e8cc000000/Cancer-incidence-patterns-in-the-Denver-metropolitan-area-in](https://www.researchgate.net/profile/Tie-Hua-Ng/publication/19569706_Cancer_incidence_patterns_in_the_Denver_metropolitan_area_in_relation_to_the_Rocky_Flats_plant/links/0a85e53a424be9e8cc000000/Cancer-incidence-patterns-in-the-Denver-metropolitan-area-in).
- [7] Kenny S. Crump, Tie Hua Ng, and Richard G. Cuddihy. "Statistical Analyses of Cancer Incidence Patterns in the Denver Metropolitan Area in Relation to the Rocky Flats Plant". In: *American Journal of Epidemiology* 126.1 (1987), pp. 127–135. ISSN: 00029262. DOI: [10.1093/oxfordjournals.aje.a114644](https://doi.org/10.1093/oxfordjournals.aje.a114644).
- [8] S. Selvin et al. "Spatial distribution of disease: Three case studies". In: *Journal of the National Cancer Institute* 79.3 (1987), pp. 417–423. ISSN: 00278874.
- [9] J. Schulman, S. Selvin, and D. W. Merrill. "Density equalized map projections: A method for analysing clustering around a fixed point". In: *Statistics in Medicine* 7.4 (1988), pp. 491–505. ISSN: 10970258. DOI: [10.1002/sim.4780070406](https://doi.org/10.1002/sim.4780070406).
- [10] Colorado Department of Public Health and Environment. *Ratios of Cancer Incidence in Ten Areas around Rocky Flats, Colorado Compared to the Remainder of Metropolitan Denver, 1990-2014*. Tech. rep. 2017, pp. 1–92. URL: <https://cdphe.colorado.gov/hm/cdphe-rocky-flats-cancer-study>.
- [11] Carl J. Johnson. "Cancer Incidence in an Area of Radioactive Fallout Downwind From the Nevada Test Site". In: *JAMA: The Journal of the American Medical Association* 251.2 (1984), pp. 230–236. ISSN: 15383598. DOI: [10.1001/jama.1984.03340260034023](https://doi.org/10.1001/jama.1984.03340260034023).
- [12] Daniel W Miles. *Radioactive Clouds of Death over Utah: Downwinders' Fallout Cancer Epidemic Updated*. 2013.
- [13] S.G. Machado, C.E. Land, and F.W. McKay. "Cancer mortality and radioactive fallout in southwestern Utah". In: *American Journal of Epidemiology* 125.1 (1987), p. 44.