A PETITION TO DECLARE TIMES BEACH, MISSOURI A NATIONAL HISTORIC LANDMARK

The Competitive Enterprise Institute formally requests that the National Park Service designate Times Beach, Missouri a National Historic Landmark.

Introduction

Salem, Massachusetts holds a sobering role in American history for its role as the setting for the infamous witch trials.[1] Likewise, the Whittaker Chambers Farm, in Westminster, Maryland, was designated as a Historic Landmark partly for its role in the "Red Scare" of the 1950's.[2] Both sites act as constant reminders of how hysteria can drive out rational discussion. The lesson of these episodes is that when irrationality infects both popular belief and government policy, the result is tragedy and waste on a massive scale.

Unfortunately, recent scares over chemical threats -- which were later found to be either groundless or wildly exaggerated -- demonstrate that we have not learned this lesson very well at all. Examples abound: the unproven health claims against Alar,[3] the now-refuted case against PCBs,[4] the alleged danger of asbestos[5] in buildings, and "poisoned" Chilean grapes[6] all illustrate that Americans have been viewing chemicals not as substances which can improve the quality of life, but rather as evils which must be eliminated at all cost. The name of this particular hysteria is chemophobia.[7]

In February, 1983, the Environmental Protection Agency announced the buyout of the small town of Times Beach, Missouri. The federal government permanently shut down the city after it was discovered that dioxin,[8] a by-product of chemical processing and incineration, had contaminated the town. The town was demolished in 1992, and currently is listed as a Superfund site.

The evacuation of Times Beach was based not on accurate scientific data about human reactions to dioxin, but rather on limited evidence about risk and exposure. Although at the time the media portrayed dioxin as "the most toxic chemical synthesized by man,"[9] this assertion was based upon certain animal studies. "The widely made claim that dioxin is one of the deadliest known, or that it is the deadliest man-made substance, is based on its extreme toxicity in guinea pigs."[10] However, dioxin is not toxic to other species, such as mice,[11] and the best studies of humans exposed to the chemical show that low doses of dioxin are not dangerous to people.

In fact, nearly a decade after the buyout, the government official who had been in charge at the time admitted that "federal environmental standards for dioxin are based on chemophobia."[12] That official, Dr. Vernon Houk, M.D., Assistant Surgeon General and Director of the Center for Environmental Health and Injury Control at the Centers for Disease Control, who made the decision to evacuate Times Beach in 1983, admitted in 1991 that he and the other officials had not adequately explained the risks to the citizens of Times Beach.[13] Later, he said that ""it looks as though the evacuation was unnecessary."[14]

Moreover, the most recent evidence shows that dioxin is not the danger to humans that it appeared to be. In September, 1994, the EPA issued a three-volume report on dioxin. Although it was a draft, and had yet to be peer-reviewed, the report's conclusion -- that current levels of dioxin exposure are already too dangerous -- was widely reported in the press.

In May, 1995, however, the EPA's own Science Advisory Board (SAB) rejected that conclusion. The panel said that the EPA's conclusions had serious flaws and had overstated the risks to humans. "The picture of scientific findings is not balanced," said Dr. John Graham of Harvard University. "Uncertainties are not analyzed seriously and quantitatively."[15]

In short, CEI maintains that designating Times Beach a National Historic Landmark would serve not only as another reminder of how easily panic can replace reason, but also as a testimonial to the importance of using good science in public policy.

Chemophobia and Times Beach, Missouri

In 1971, waste hauler Russell Bliss was hired to oil the dusty roads of Times Beach, Missouri.[16] Bliss unknowingly mixed dioxin-contaminated waste with the oil.[17] The roads were later paved, and for the next ten years, all was relatively quiet at Times Beach. Then, in 1982, the government began to take random soil samples around parts of Missouri to test for dioxin levels.[18]

On December 23, 1982, the Environmental Protection Agency revealed that the research had identified what the agency considered to be dangerous levels of dioxin in the soil at Times Beach.[19]

While the danger from dioxin to the residents of Times Beach was, according to the available epidemiology, low, and although animal tests were inconclusive, the media presented dioxin exposure as a tangible risk that required immediate action.[20] These stories, combined with the EPA's questionable scientific data,[21] exaggerated the danger facing the 2,240 citizens of Times Beach. Popular magazines used the Times Beach dioxin story to play not only upon people's suspicion of the unknown, but also their growing distrust of man-made chemicals.

For example, a *New York Times* piece on January 23, 1983 asserted that humans who had been exposed to dioxin suffered "a variety of severe health problems, including kidney and liver ailments, birth defects and cancer." *Newsweek* magazine referred to "the deadly chemical's legacy," while the *Wall Street Journal* claimed on March 1, 1983 that Times Beach was "dying of

toxic chemical waste..." There was no factual evidence to corroborate these claims; in fact, as will be discussed later, earlier data collected at other sites of accidental dioxin exposure had indicated no serious ailments, birth defects, or cancers.

Government scientists only served to intensify these unfounded fears. Residents and their neighbors began to believe that many of their health problems were attributable to dioxin, no doubt partially due to the presence of government officials. During a town meeting held in early January, 1983, the Centers for Disease Control's Dr. Henry Falk encouraged residents to consider whether any physical ailments they were experiencing could be related to dioxin. "Many of the residents attending [an information] session told [Dr. Falk] about persistent rashes, and other medical ailments that may be related to dioxin pollution. Said Falk: 'It would be difficult to overstate the problems here.'"[22]

No contrasting evidence was ever presented to the residents. Dr. Houk later reflected, "We should have been more upfront with the Times Beach people and told them, 'we're doing our best with the estimates of risk but we may be wrong.' I think we never added, 'but we may be wrong."[23]

In short, although the residents of Times Beach did not at first feel that the dioxin presence warranted leaving town,[24] the damaging evidence from seemingly reliable sources, coupled with a relatively unknown and, therefore, fearsome substance, led to an increase in chemophobia. It seemed easiest for the townspeople to try and sell their property, and be evacuated.

Environmental health specialist Karen Webb of the St. Louis University School of Medicine noted, "the problem is, with any group of people, you're going to have people get sick and everything gets assigned...That's what's going on [at Times Beach]. People say I don't care what your study says, I know that two people have cancer, and one woman had a miscarriage."[25] In the case of Times Beach, just as in the Salem witch trials and the "Red Scare," the facts were not as important as the public's perception of them.

Finally, in February, 1983, the Environmental Protection Agency, in an unprecedented move, offered a total of $32 million dollars to buy the town. Some residents still did not want to leave, but with little other choice available to the residents of this frightened community, Times Beach, Missouri closed.[26]

Chemophobia and Dioxin

While dioxin had been shown to cause adverse effects when given in low doses to animals, dioxin's exact effects on humans aren't clear. The closely followed epidemiological studies of the time confirmed that there did not appear to be a low level at which dioxin seriously affected human health.

The problem starts with the EPA's linear dose model, which implies that there is no safe

level of exposure. But the evidence indicates that "dioxin probably has a threshold level. The EPA currently treats it as something for which there is no dose that doesn't produce a health effect. That isn't true," Dr. Renate Kimbrough, a dioxin specialist and former EPA official, stated in 1991.[27] Nevertheless, such a model was in place at the time of the evacuation.

Moreover, publicity centered on a series of studies from Sweden which claimed there was a link between dioxin exposure and soft-tissue sarcomas, a form of cancer. But no other studies could find similar results, according to dioxin expert Dr. Michael Gough, formerly of the Office of Technology Assessment Biological Application Program and now Director of Science and Risk Studies at the Cato Institute. Gough says, "the Swedish studies appear to be outliers, different from all the others, providing no convincing evidence of an association between dioxin exposure and soft tissue sarcomas."[28] The most common effect of dioxin exposure, and one which occurs only at very high levels, is chloracne, an acne-like skin disorder indicating high exposure to dioxin. There were no chloracne cases at Times Beach.

In short, at the time of the buyout, available evidence demonstrated that humans exposed to levels of dioxin far higher than those found at Times Beach had not been harmed. However, the EPA, basing its actions on the linear-dose model, disregarded other evidence. The following studies suggest that there is a "safe" dose of dioxin, and that the EPA continues to underestimate it greatly.

Ranch Hand Studies

The members of Operation Ranch Hand, the American soldiers in Vietnam who were responsible for 90 percent of the spraying of Agent Orange, had many times the amount of dioxin in their systems than those soldiers who fought on the ground. Although Agent Orange has been blamed for cancers and birth defects in veterans and their offspring, there is no evidence that Ranch Handers have significantly higher levels of cancer than the general population.[29]

The May, 1995 SAB panel discussed the results of the many studies of Ranch Handers. Dr. Sidney Stohs, Dean of Creighton University in Omaha, Nebraska noted that the Ranch Hand data "clearly [indicate] a wide variation in response to a curve with highly exposed individuals exhibiting little more or no effects or currently measurable effects as compared to lesser exposed individuals."[30]

Seveso Studies

In 1976, at the ICMESA plant near Seveso, Italy, a cloud containing a large percentage of dioxin was accidentally released into the atmosphere, settling on the surrounding area. The surrounding population was closely monitored and examined.

The Seveso population -- men, women, children -- had been exposed to dioxin in much greater concentrations than the people of Times Beach. By 1979, only three years after the accident, physicians in the area realized that health damage in the heavily exposed population at

Seveso was minimal to non-existent.[31] For example, some of the children received an average dose of dioxin three times higher than a dose lethal to guinea pigs. Yet these children only developed chloracne.[32] More recent studies have confirmed those observations.[33]

Nitro Studies

In 1949, many workers were exposed to dioxin in an accident at a Monsanto chemical plant in Nitro, West Virginia. The dioxin exposure caused chloracne in some workers, but few other effects.[34] One study followed the workers for thirty years, and, although it cannot be considered conclusive, emphasized that "it is important that no apparent excess in total mortality or in deaths [from certain diseases] was observed in a group of workers with a high peak exposure to [dioxin]."[35]

However, this well-established and readily available research on the Nitro incident was not accepted by the health authorities responsible for the Times Beach evacuation. This research was further confirmed after 1983.[36]

Dow Studies

Additionally, two major long-term studies were available which examined the health of workers who had spent a good portion of their lives working for Dow Chemical Company in work places with high dioxin levels, much higher than the levels of exposure at Times Beach. This data showed that

> "At the exposure concentrations...experienced by the workmen in this study, no adverse mortality effects have been observed in association with the work environment. Within the scope of this limited survey, mortality has been favorable compared to that of U.S. white males, and also compares well with the background mortality experience at this manufacturing location."[37]

Another study, performed on individuals exposed to dioxin in a 1964 accident, found that among observed workers, "overall mortality was about 50% of that expected." Moreover, the same study concluded that "the latency period for this cohort...exceeded 14 years...[and would] seem sufficient to allow the identification of a potent human carcinogen....All of this suggests that [dioxin] is not a potent human carcinogen."[38]

Fingerhut Studies

The National Institute for Occupational Safety and Health (NIOSH) released a study in 1991 of workers in plants that produced dioxin-contaminated herbicide. The study looked at the risks for all cancers, and for lung cancer and soft-tissue sarcoma. "At the very most, the NIOSH study found an elevated risk [for all cancers] only for those exposed to tremendously high levels of dioxin," in this case, the chemical plant workers. However, the study did not take into account the effects of smoking on lung cancer risk rates.[39]

In contrast to the Swedish studies, the NIOSH study also found that "mortality from several cancers previously associated with TCDD [dioxin]...was not significantly elevated...Mortality from soft - tissue sarcoma was increased, but not significantly." The study also left open the possibility that cancer rates could be elevated because the workers "may have been exposed to numerous other chemicals while employed at the plants."[40]

Current evidence -- including a recent study showing that the cancer rate is normal for 154 people who lived in one of the areas of highest exposure in Times Beach[41] -- continues to support dioxin's low toxicity in humans.[42] This data was so convincing that Dr. Houk stated in 1991 that "if [dioxin is] a carcinogen, it's a very weak carcinogen."[43]

During questioning before a subcommittee of the House Committee on Government Operations in 1990, Dr. Houk acknowledged that "though this compound is extremely toxic to guinea pigs, it may be without consequence even in very high exposure to humans."[44]

Chemophobia and Risk Perception

Once viewed as tools to improve the life of humans, industrial chemicals and by-products came under increasing attack as books such as *Silent Spring* became popular in the 1960s. Portrayed as the domain of a wealthy industrial class, such chemicals seemed to be used in a manner which would place burdens of diseases and death upon the working poor.[45]

With chemical technology, as with most things, come risks as well as benefits. However, most information about chemicals is confusing to the average citizen, who is not well-informed about the trade-offs involved. When it comes to judging the risk of chemicals, most people trust the government's pronouncements on science. Consequently, whatever view government science puts forth becomes the final word on any chemical.[46]

Some of the most widely publicized government information on cancer and chemicals have given the impression that almost all chemicals are dangerous to humans, and that cancer would all but disappear but for these chemicals.[47]

The media, with its knowledge of how fear sells, and politicians, always looking for a cause, exaggerate these fears. "Almost daily, the news media report on the presence of one chemical or another that is claimed to be carcinogenic....The public is bombarded with reports that raise fear and apprehension."[48] On the other hand,

> "Whatever the scare of the day, officials stand ready to formulate quickly congressional testimony, briefing papers, news releases, and programs that demonstrate their unsurpassed commitment to protecting the public. Dare they hesitate, and an ambitious congressman armed with staff and a subcommittee will leap forward to take their place in front of the cameras."[49]

As Dr. Kimbrough says, "I guess what we all need is a little common sense [about chemicals], which we really haven't had in the last couple of decades."[50]

Conclusion

In many matters of public policy, the lay public, for reasons described above, often takes the ostensibly reasonable attitude that it is better to be safe than sorry. This is especially true for issues involving the risks of chemicals. The following statement by Joe Thornton, Research Coordinator for Greenpeace, may sound quite reasonable:

> "Prevention of disease is the highest mandate, and proof is not required before a preventive strategy should be pursued.... I would urge that if errors are to be made in characterizing the health consequences of dioxin, it is better to err on the side of caution to protect human health than on the side of allowing health impairment and death."[51]

Who, indeed, wouldn't want to protect human health? However, the idea that proof of "guilt" is not necessary and that the health of the public is in imminent danger neglects the fact that trade-offs involving relative risks always exist. The implications of Mr. Thornton's point of view, adopted as public health policy, are extraordinary.

But whether it is better to err on the side of caution, and just what constitutes caution, depends upon the situation. Sometimes overcaution can be worse than lack of caution. For example, one does not shout "fire" in a crowded theater until one is certain that there is smoke. For the same reason, government agencies should not have destroyed an entire town, disrupting the lives of all of its citizens, without proof.

Different circumstances breed different fears which seek to explain the misfortunes that have accompanied humans throughout history. For example, 17th-century Salemites feared the influence of witches. By identifying, removing, and destroying witches, the townspeople believed they could also eliminate the common woes of daily existence, which were, they believed, caused by the devil's presence and influence.

In the technological society of the twentieth century, science and industry continue to introduce an ever-growing number of new substances, many of which provided incalculable benefits. However, since diseases such as cancer still remain, some continue to search for a "witch" to blame.[52] For many, chemicals are that witch.

We believe that making Times Beach a National Historic Landmark will underscore the necessity to use science, not politics, when determining the extent of environmental threats. It would also remind us that in matters of public policy, reason should triumph over panic.

Respectfully submitted,

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Eric Askanase
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February 22, 1996

Endnotes

1. The National Register of Historic Places Property Report lists 39 sites around Salem, MA as historical landmarks.

2. Barry Mackintosh, Bureau Historian for the National Park Service, stated in his May, 1988 nomination form that the Hiss-Chambers case "inspired excesses: two weeks after Hiss's sentencing, 'McCarthyism' was launched when the opportunistic Senator Joseph R. McCarthy of Wisconsin charged, with insufficient evidence, that 205 unnamed Communists then infested the State Department" (p.18).

3. Alar was the center of controversy when the Natural Resources Defense Council pressed the EPA to rescind its licensed use as a pesticide because it was thought to be a carcinogen. According to Eliot Marshall, "EPA, in a just completed toxicology analysis, finds that Alar...[is] half as potent as the agency estimated at the peak of the Alar crisis in 1989...The 1989 estimate was itself a factor of 10 lower than a potency estimate made by the EPA in 1987, which was cited by environmentalists during their campaign to ban Alar." ["A is for Apple, Alar, and ... Alarmist," *Science*, 4 October 1991, pp. 20-22.] The National Resources Defense Council utilized a scare campaign which, supported by the media and such superstars as Meryl Streep and journalist Ed Bradley, succeeded in forcing Alar's manufacturer to withdraw its product.

4. PCBs were used as transformer coolants in the late 1970s. Concerns arose when it was discovered that PCBs with a high chlorine content could cause cancer in laboratory animals; however, only about 12 percent of all PCBs used in the United States had a chlorine content high enough to match those tests. Even then, by the late 1970s, PCB production ceased in the U.S.

According to Phillip H. Abelson, there were many cases of high exposure to PCBs in the 1950s, '60s, and '70s, "but the industrial exposure led to no known [human] cases of cancer." ["Excessive Fear of PCBs," *Science*, 26 July 1991, p.361.] In fact, Abelson comments, according to a study by E. Schaeffer, H. Greim, and W. Goessner, when rats were exposed to lesser chlorinated PCBs, they lived longer than the control animals. [*Toxicol. Appl. Pharmacol.* 1984;75:278. Abelson's citation]. Abelson quotes other studies, such as that by the Institute for Evaluating Health Risks, as confirming that PCBs are dangerous to laboratory animals only above a certain chlorination level.

In their toxicity guidelines for PCBs, even the EPA admitted that "there is inadequate evidence of carcinogenicity of PCBs in humans." ["Environmental Protection Agency -- National Primary Drinking Water Regulations, Final Rule." 40 CFR parts 141, 142, and 143. *Federal Register*, January 30, 1991, 3542.]

5. Abelson, Phillip H. "The Asbestos Removal Fiasco," *Science*, 2 March 1990, p.1017. In his editorial, Abelson stresses that "four epidemiological studies of Quebec chrysotile [asbestos] mining localities show that lifelong exposure of women to dust from nearby mines caused no statistically significant excess disease."

Mossman, B.T., J. Bignon, et al, "Asbestos: Scientific Developments and Implications for Public Policy," *Science*, 19 January 1990, 294-301. The authors conclude that "available data do not support the concept that low-level exposure to asbestos is a health hazard in buildings and schools" (p.294).

6. In March, 1989, an anonymous caller to the U.S. Embassy in Chile warned that fruit headed to the U.S. had been injected with cyanide. A Food and Drug Administration inspector found three grapes with white rings, later recognized as harmless talc residues from the sprays used by Chilean growers.

Although FDA experts already knew that harmful doses of cyanide make grapes shrivel up and turn black,

and that therefore the grapes in question could not have been contaminated with cyanide, the FDA impounded 2 million crates of grapes and warned consumers not to eat Chilean fruit.

The only deaths to result from this fiasco, which cost Chile's private sector $300 million and 20,000 jobs, were those of FDA investigators killed in a helicopter crash while researching the incident. Their deaths, as reported in the *Washington Times* on February 6, 1990, can be attributed to chemophobia.

7. The phrase "chemophobia" has been used in Congress, political research, and technical fields for years to describe an irrational fear of chemicals.

8. "Dioxin" generally refers to 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin (TCDD).

9. Biddle, Wayne. "Dioxin Use on Arkansas Rice Raises Concerns about Health," *The New York Times*, April 9, 1983, p.A1.

10. Rawls, Rebecca L. "Dioxin's Human Toxicity is Most Difficult Problem," *Chemical and Engineering News*, Vol.61, No. 23 (June 6, 1983), p.37.

11. Fumento, Michael. *Science Under Siege*. New York: William Morrow and Co., Inc, 1993, p.100.

12. "CDC Interference in Dioxin Water Standards," *Hearing Before the Human Resources and Intergovernmental Relations Subcommittee of the Committee on Government Operations*, House of Representatives, 101st Congress, Second Session, July 26, 1990, p.33, hereafter, "Hearing."

Representative Ted Weiss asked Dr. Houk, "Did you inform Dr. Jennifer Christian on July 14, 1989, that Federal environmental standards for dioxin are based on chemophobia?"

Houk responded, "Yes."

13. Uhlenbrock, Tom. "Dioxin Scare now called mistake: Citing Studies, Health Official Concludes Times Beach Evacuation Wasn't Needed," *St. Louis Post-Dispatch*, May 23, 1991, p.A1.

14. Schneider, Keith. "U.S. Officials Say Dangers of Dioxin were Exaggerated," *New York Times*, August 15, 1991, p.1.

15. Transcript of Science Advisory Board panel discussion, May 15-16, 1995, p.182, hereafter "SAB."

16. Felton, Eric. "The Times Beach Fiasco," *Insight*, August 12, 1991, p.14.

17. Lerner, Michael A. "The Trouble at Times Beach," *Newsweek*, January 10, 1983, p.24.

18. Felton, 14 [see note 16].

When horses in several horse arenas began to mysteriously fall sick, the Missouri Department of Health and the Centers for Disease Control determined, after a lengthy investigation, that dioxin was the cause. Eventually, it was learned that these arenas had also been sprayed by Bliss. When the investigation spread out to more of the surrounding area, Times Beach was found to have high levels of dioxin, too.

19. Ibid. [see note 16].

20. Lerner, 24 [see note 17].

The article notes that since 1974, "the Centers for Disease Control determined that dioxin had affected the health of at least 10 people and killed hundreds of animals at various Missouri locations." Lerner implies that there is a direct link between dioxin and the animal deaths, and, therefore, that the animal deaths indicate that dioxin is harmful to humans. This inference was not, and has not, been established.

21. Felton, 16 [see note 16].

The EPA put more emphasis on its unreliable animal testing than the empirical evidence of Seveso and Nitro. Additionally, Marc Landy, a professor at Boston College and co-author of *The Environmental Protection Agency: Asking the Wrong Questions*, claims political motivation played a large role in the EPA case against Times Beach...it temporarily 'took the heat off' problems the agency was experiencing [also see "Will EPA's Offensive Stem the Furor?" *U.S. News and World Report*, March 7, 1983, p.13].

22. "The 'River Rats' Want to Stay," *Time*, January 10, 1983, p.21.

23. "Dioxin Scare..." [see note 13].

24. "I've talked to about 100 people. They say to hell with it, they're staying," said Times Beach mayor, Sidney Hammer. The general feeling of the residents is echoed by Laverne Baker, who said, "if it's [dioxin] going to harm us, it already has, as far as I'm concerned." ["If It's in the Dirt, I'm Eating It, Too: Residents at Dioxin Site," *United Press International*, 25 December 1982.]

25. Felton, 15 [see note 16].

26. Bukro, Casey. "As Town is Razed, Some Think Danger Wasn't Real," *Chicago Tribune*, February 27, 1992, p. A10.

27. Swanson, Stephenson. "On Second Thought, Toxic Nightmares May Be Unpleasant Dreams," *Chicago Tribune*, September 1, 1991.

The National Research Council, in a recent report on natural carcinogens, notes that such models of exposure are "a qualitative test that alone is not sufficient for human risk assessment....there are examples where species-specific responses in rodents can occur that might not be relevant to humans." [National Research Council, *Carcinogens and Anticarcinogens in the Human Diet*, National Academy Press: Washington, D.C., February, 1996, p. 201-202.] The report continues, "Prediction of human cancer risks based on laboratory results is uncertain because extrapolations must be made from high to low doses and from animals to humans. Thus, important questions remain about the relevance of findings from animal studies for predicting human cancers" (p.303).

28. Gough, Michael. *Dioxin, Agent Orange: The Facts*. New York: Plenum Press, 1986, p.199.

29. Fumento, 147 [see note 11].

30. SAB p.142 [see note 15].

Also see Michalek, Joel, et al. "Health Status of Air Force Veterans Occupationally Exposed to Herbicides in Vietnam, II Mortality." *Journal of the American Medical Association*, 1990;264:1832-36, p.1835.

31. At Seveso, "the rate of abortions and malformations, the growth of newly born infants, the immunoresponse, the chromosome aberrations, the reaction to infectious diseases, the morbidity and mortality have not been affected by the amount of TCDD [dioxin] exposure." [Homberger, E., et al. "The Seveso Accident: Its nature, extent and consequences," *The Annals of Occupational Hygiene*, 1979;22:327-70, p.363.]

In support of this, see Bonaccorsi, Aurora, et al. "In the Wake of Seveso," *Ambio*, 1978;7:234-39, and Pochiari, Francesco, et al. "Human Health Effects from Accidental Release of Tetrachlorodibenzo-p-Dioxin (TCDD) at Seveso, Italy, *Annals of New York Academy of Sciences*, 1979;320:311-320.

Although in his book, author Thomas Whiteside attempts to paint the Seveso incident as an environmental and health catastrophe of the highest magnitude, he notes that "I asked the doctors [in Seveso] what impression they had of the effects of dioxin on the population. Their spokesman said in general except for the chloracne outbreaks among young people, there appeared so far to be no great clear-cut effects on the health of the population as a whole." [*The Pendulum and the Toxic Cloud: The Course of Dioxin Contamination.* New Haven: Yale University Press, 1979, pp.116-117.]

32. Gough, Michael. "Human health effects: what the data indicate," *The Science of the Total Environment*, Vol. 104 (1991): 129-158.

33. Bertazzi, Pier Alberto, et al. "Ten Year Mortality Study of the Population Involved in the Seveso Incident in 1976," *American Journal of Epidemiology*, 1989;129:1187-1200.

This study examined the cancer, birth defect, heart disease, and mortality rates of the population exposed to dioxin in the Seveso. The authors found no statistically significant increase in these rates within the population which could be linked to dioxin. Decreases in rates of certain cancers were noted but also could not be explained. They concluded, "results of this descriptive mortality investigation do not permit conclusively associating any of the noted increased risks with the [Seveso] accident in 1976" (p.1198). Studies are continuing.

34. Zack, J.A. and R.R. Suskind. "The Mortality Experience of Workers Exposed to Tetrachlorodibenzodioxin in a Trichlorophenol Process Accident," *Journal of Occupational Medicine*, 1980;22:11-14.

Zack, Judith A. and William R. Gaffey. "A Mortality Study of Workers Employed at the Monsanto Company Plant in Nitro, West Virginia." In Tucker, Richard E., Alvin L. Young, and Allan P. Gray, eds. *Human and Environmental Risks of Chlorinated Dioxins and Related Compounds.* New York: Plenum Press, 1983, pp.575-591.

Both the Zack-Suskind and the Zack-Gaffey studies, available during the decision-making at Times Beach, demonstrated little decline in overall health and mortality for workers exposed to dioxin at the Nitro facility. According to Zack-Gaffey "the proportion of cancer groups among 2,4,5-T [dioxin exposed] workers is lower than in the non-exposed group."

However, the health agencies felt that the data was imprecise, and that methods of assessing the correct levels of dioxin exposure were unavailable, both here and in Seveso. During a 1992 interview, Dr. Houk stated that in 1983, he had believed the Nitro incident was not scientific enough to be used in his data. He had felt that there were no scientific controls on levels and exposure which would allow for accurate analysis.

Nonetheless, dioxin specialist Michael Gough, formerly of the Office of Technology Assessment Biological Application Program, and now Director of Science and Risk Studies with the Cato Institute, said that if the government was serious, it could have obtained accurate human data. He stated, "CDC put such effort into estimating soil levels, they could have looked as hard at whether or not any of the people had 'elevated' levels of

dioxin...but the government wanted to regulate" [personal interview with Eric Askanase, 1992].

35. Zack-Suskind, p.11 [see note 34].

36. Suskind, R.R. and V.S. Hertzberg. "Human Health Effects of 2,4,5-T and its Toxic Contaminants," *Journal of the American Medical Association*, 1984;251:2372-80.

"The data assembled in this study indicate no evidence of increased risk of cardiovascular disease, hepatic disease, renal damage, or central or peripheral nervous system problems" (p.2372).

37. Ott, M.G., et al. "A Mortality Analysis of Employees Engaged in the Manufacture of 2,4,5-Trichlorophenoxyacetic Acid," *Journal of Occupational Medicine* 1980;22:47-50.

38. Cook, Ralph R., et al. "Mortality Experience of Employees Exposed to 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)," *Journal of Occupational Medicine*, 1980;22:530-32, p.532.

39. Fumento, 105 [see note 11].

40. Fingerhut, Marilyn et al. "Cancer Mortality in Workers Exposed to 2,3,7,8-Tetracholordibenzo-p-dioxin," *New England Journal of Medicine*, Vol. 324, No. 4 (January 24, 1991), p.214, 217.

..The study, conducted by Karen Webb, Director of the Division of Environmental and Occupational Health at the St. Louis University Sch edicine, is cited by Felton [see note 16].

According to Michael Gough, available data of the highest known dioxin exposure to humans reveals only chloracne, a skin irritation, an l number of cases involving liver and nerve damage; no reports of birth defects, tumors, or cancers resulting from exposure to dioxin have bee d. ["Reevaluating the Risks from Dioxin," *Journal of Regulatory and Social Costs*, January, 1991, p.17.]

In a 1987 World Health Organization report, evidence for dioxin's carcinogenicity in humans is called "inadequate." [World Health anization: International Agency for Research on Cancer, *IARC Monographs on the Evaluation Of Carcinogenic Risks To Humans, Overall uations of Carcinogenicity*, Supplement 7 (1987): p.350.]

Schneider [see note 14].

Hearing, p. 34 [see note 12].

Dake, Karl and Aaron Wildavsky. "Theories of Risk Perception," *Daedalus*, Fall 1990, p.41-60.

A contributing factor to the rising chemophobia may have been the rise of egalitarianism as a perceived social good. Wildavsky and I that "people who hold an egalitarian bias (who value strong equality in the sense of diminishing distinctions among people such as wealth, r ler, authority, etc.) would perceive the dangers associated with technology [including chemical technology] to be great, and its attendant ben small" (p.45). They believe that the environment is the property of everybody and that technology will be used by the wealthy to their advanta to the detriment of both the environment and those less fortunate.

The egalitarian rhetoric of the 1970's and 1980's inspired fear of chemicals precisely because they were not the tool of the common per r, they were unknown, "elitist" factors. These egalitarians were very willing to have government intervene in order to ameliorate such inequa

6. Clark, William C., "Witches, Floods, and Wonder Drugs: Historical Perspectives on Risk Management." [in Albers, Walter A. and Richar chwing. *Societal Risk Assessment: How Safe is Enough?* New York: Plenum Press, 1980, pp.287-313.]

Clark discusses the various factors which lead a person to accept the chemophobic perspective. He says that risk is not based on toxicity of tance, but on the perceived inability to deal with the risk that surrounds us. He further states that when people have a great dependance upon a le source for their information (eg. governmental science agencies) they tend to be more rigid in their ability to perceive risk (p.287).

7. Chemophobia scares society into an irrational mentality about the risks associated with chemicals, especially cancer. If cancer rates in the rly increase, it is tempting to assume that those extra cancers are due to external factors. However, it is precisely *because* our society has becor · and healthier, and has eliminated most of the risks which caused people to die young that cancer rates in the elderly have increased. Bruce :s, a professor of biochemistry and molecular biology at the University of California at Berkeley, notes that "Cancer is a degenerative disease of in the same way as heart disease and cataracts....It doesn't mean that external factors can't influence it--we know cholesterol influences heart ase, and smoking is ten years off your life....But underlying it all, the reason there is more cancer is more people are...living longer and longer y year, and as we're living longer, we see an increase in cancer." [quoted in Postrel, Virginia. "Of Mice and Men," *Reason*, December, 1991, .]

8. NRC study, p. ix [see note 27].

9. Sapolsky, Harry M. "The Politics of Risk," *Daedalus*, Fall, 1990, p.91.

0. Swanson [see note 27].

1. SAB, p.124 [see note 15].

2. An adjunct to chemophobia --- fear of technology over nature -- is described in Glickman, Theodore S. and Dominic Golding. "Recent Tr Iajor Natural Disasters and Industrial Accidents," *Resources*, Resources for the Future (Summer 1992): 9-13. According to the authors, during od from 1945-1986, 15,000 died in natural disasters in North America, while only 2,016 died from industrial accidents; the authors fo ever, that "risks due to technological hazards are perceived by the public to be higher than risks due to natural hazards" (pp.10-12).