THE PUBLIC VISITS A NUCLEAR WASTE SITE:
SURVEY RESULTS FROM
THE WEST VALLEY DEMONSTRATION PROJECT

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ABSTRACT

This paper will discuss the results of the 1986 survey taken at the West Valley Demonstration Project Open House where a major nuclear waste cleanup is in progress. Over 1400 people were polled on what they think is most effective in educating the public on nuclear waste. A demographic analysis describes the population attending the event and their major interests in the project.

Responses to attitudinal questions are examined to evaluate the importance of radioactive waste cleanup as an environmental issue and a fiscal responsibility. Additionally, nuclear power is evaluated on its public perception as an energy resource.

The purpose of the study is to find out who visits a nuclear waste site and why, and to measure their attitudes on nuclear issues.

INTRODUCTION

The West Valley Demonstration Project, located 35 miles southeast of Buffalo, New York, is the site of a former nuclear fuel reprocessing center. The plant is currently undergoing decommissioning and high level wastes there will be converted to borosilicate glass and sent to a federal repository. The project is directed by the U.S. Department of Energy and operated by the West Valley Nuclear Services Company, a division of the Westinghouse Electric Corporation.

An Open House has been held each year at the facility since the project began in 1982. The purpose of the event is to explain the project to the public and allow people to see first hand the progress being made. This paper will discuss a 1986 survey conducted at the event designed to research the demographics of attendees and their attitudes on radioactive waste and nuclear energy.

LITERATURE REVIEW

Nuclear Issues: The Social Side

Isolating radioactive wastes has been a matter of public concern for less than a decade and research on public response to the problem is also recent. Regarding social issues raised by nuclear power, there exists a significant body of work which suggest major public trends. (1)

Public opinion on nuclear issues has been evaluated by a number of major survey studies. In 1978 the Battelle Human Affairs Research Center published a comprehensive overview of surveys dealing with public attitudes on nuclear power.(2) In 1982 the Office of Technology Assessment produced a study based on a Wisconsin survey which dealt with nuclear waste.(3) Both of these major studies indicate weakening support for the nuclear industry and an erosion of public confidence in government institutions.

A second collection of studies done in the 1970s used clinical methods to explore personal fears and emotional responses to nuclear energy. The bottom line of this research indicates that public concern over nuclear power and radioactive waste is displaced fear from nuclear weapons.(4)

A third body of data consists of risk studies. Psychologists at Decision Research Inc. in 1978 asked people to make judgments about risky technologies and activities including nuclear power, other energy sources and x-rays. People placed nuclear power at the upper extremes on the risk indexes.(5) An historical examination follows which tracks emerging nuclear concerns.

Emerging Nuclear Concerns

Public attitudes on nuclear power were generally positive until the last decade. Dangers of atmospheric fallout from the testing of nuclear weapons was an early public concern. However, there has been consistent concern over the development of nuclear weapons since their inception and substantial public support for efforts to limit them has increased dramatically into the 1980s.

The press reported accidents in the 1950s at the Chalk River, Fermi, and Windscale Plants that raised questions. Little attention was given to

nuclear concerns by the media in the 1960s. In 1975 the Browns Ferry nuclear plant fire drew attention, but the key event that stimulated tremendous media and public concern was the accident at Three Mile Island four years later.

A 1960 survey of attitudes on the siting of the Indian Point reactor revealed that 57 % of respondents felt confident that waste isolation was safe and only 13 % had some questions. A national survey in the same year found that none of the respondents who opposed nuclear power gave waste management problems as a reason. (6)

The environmental movement born in the 1960s focused on energy and waste management issues. (7) Public attention was drawn to nuclear waste problems such as the leaking of radioactive wastes from storage tanks at the Hanford Reservation in Washington State in 1973. In 1974, a survey by Opinion Research Corporation found that 52 % of the respondents believed that waste management was a serious problem. That was more than the combined percentages of respondents who cited radiation, nuclear accidents, and thermal pollution as concerns. (8)

A Resources for the Future Survey in 1980 found that nuclear power stood at the bottom of the public's list of preferred energy sources. Waste issues continued to rank at or near the top of public concerns over nuclear power during the latter half of the 1970s. The Panel on Social and Economic Aspects of Radioactive Waste Management concludes that if the high level of concern about radioactive wastes persists public acceptance will be a difficult goal to achieve for any large scale waste management program. (9)

Demographics

There is a consistent tendency for women to be more opposed to nuclear energy than men. The 1977 Battelle review found that among men the average support for nuclear power was 65 % as compared with 46 % among women. (10)

Other demographic variables of concern about nuclear power and radioactive wastes are less well understood. Persons under 30 are more likely to oppose nuclear power than are older persons. Correlations with education and income tend to be inconsistent. Some survey results indicate that highly educated and higher income groups support nuclear power whereas others provide contrary results. (11)

Lack of Information

Research has questioned the view that greater knowledge produces a more favorable attitude to nuclear energy. An Oak Ridge study found no relationship. (12) A comprehensive study in Washington state found no significant difference in knowledge between opponents and supporters of nuclear power. (13) Overall, results suggest that knowledge tends to confirm rather than shape attitudes.

Nuclear Fear

The 1959 film based on Nevil Shute's novel On the Beach portrayed the end of humanity as a result of nuclear war. John Hersey's book Hiroshima describes in detail the destruction caused by an atomic bomb. Civil defense drills and the Cuban missile crisis made the prospect of nuclear war a real one. It can be argued that a substantial part of the public concern over nuclear power plants represents anxiety "displaced" from the fear of nuclear weapons. (14)

Perceived Risks

Many experts hold that the risks posed by radioactive wastes and nuclear power are no greater than other generally accepted technologies. One hypothesis for this is that nuclear power elicits extraordinary concern because of the characteristics rather than the amount of its risks. Psychologists at Decision Research in 1978 asked people to judge the risks. People scored nuclear power at or near the high-risk end on most of the characteristics. (15)

Erosion of Public Trust

Public concern over radioactive wastes, it has been suggested, reflects a distrust of the institutions that manage them. A 1980 survey of Wisconsin residents revealed that most people did not believe that the government was acting fast enough to solve the problem and find a waste repository. Respondents ranked the federal government behind the news media, university scientists, and environmental groups, and just ahead of friends and acquaintances, as the most reliable source of information about nuclear wastes. The study says erosion of public confidence in the federal government is the single greatest obstacle that a successful waste management program must overcome. (16)

Research Summary

The studies elicit several major observations. Public support for nuclear power has weakened significantly over the last 15 years. Women are more opposed to nuclear energy than men and younger people are more likely to oppose nuclear power than are their older cohorts. It appears the public does not distinguish clearly between the risks of nuclear weapons and nuclear power; furthermore, the level of knowledge about nuclear power and radioactive wastes remains low among the general public. Finally, public concern over nuclear waste issues is complicated by mistrust of government in general.

THE WEST VALLEY SURVEY

Purpose

The following study tests several of the relationships raised by previous research on the demographics of nuclear attitudes. The sample is comprised of 1409 persons surveyed while attending an Open House in 1986 at the West Valley Demonstration Project (WVDP).

Variables

The survey consisted of eleven questions. The four demographic variables were gender, age, residence and education. Age was categorized as teens, 20s, 30s, 40s, 50s, 60+s. Residence was coded so as to get an urban-rural measure with Buffalo appearing first and more distant areas following it. Education was broken into the

categories of some high school, high school graduate, some college, and college graduate. Respondents identified their highest level of attainment.

The next three questions asked why respondents attended the Open House event, what they thought was most important about the project, and how they learned the most about nuclear waste cleanup at West Valley. Attendees were given a choice of reasons for attending the event which ranged from "friends" and "relatives who work at the site" to "interest in environmental issues" and "advanced technology." Respondents chose what they thought was the most important activity of the project from entries such as "radioactive waste solidification" and "environmental monitoring." Finally, those surveyed were asked to indicate how they learned the most about the project with the choices being the "site tour," "exhibits," "talking to employes," or "reading about the facility."

Questions eight through eleven on the survey were constructed as attitudinal variables. In question eight respondents were asked to rank radioactive waste cleanup in terms of its importance. The top of the scale listed cleanup as the "most important environmental action of our time" and the bottom of the scale listed cleanup as a "waste of time and money." Question nine asked whether industry, government or both should pay for the cost of radioactive cleanup. Question ten measured support for nuclear energy ranging from its consideration as the "best and most important energy source" to its characterization as a "mistake in general." The final question asked whether the Open House changed the respondents attitude toward nuclear waste management within a positive or negative fashion.

HYPOTHESES

Based on a review of the literature ten hypotheses are drawn and will be tested with the survey data.

Hypothesis 1: The general public has a high concern for radioactive waste cleanup.

Rationale: This hypothesis is drawn from the summary of studies examined by the Panel on Social and Economic Aspects of Radioactive Waste Disposal. The purpose here is to see what priority people place on radioactive waste cleanup.

Hypothesis 2: Women show greater support for radioactive waste cleanup than men.

Rationale: There is little research in this area. The hypothesis is predicated on women perceiving radioactive waste cleanup as a genetic benefit by placing a higher priority on it.

Hypothesis 3: Men show greater support for nuclear energy than women.

Rationale This relationship has been shown by a number of studies done in the past. This study will serve as a data point to note whether this relationship is changing.

Hypothesis 4: Younger persons show more support for radioactive waste cleanup than do their older cohorts.

Rationale: Younger persons are more likely to have formed supportive attitudes on radioactive waste cleanup as a result of the relatively recent environmental movement. Older cohorts are more likely to have formed less supportive attitudes on waste cleanup because waste has historically been given a low priority.

Hypothesis 5: Older persons indicate more support for nuclear energy than do their younger cohorts.

Rationale: Older persons are more likely to have formed attitudes about nuclear energy when it was being hailed by the government and the media. Younger persons are more likely to have formed attitudes on nuclear power in the more recent era of heavy criticism.

Hypothesis 6: Education is positively associated with support for radioactive waste cleanup.

Rationale: It is thought more educated persons commit more time to electronic print media which have publicized nuclear waste issues.

Hypothesis 7: Education is inversely associated with support for nuclear energy.

Rationale: Results from past studies have been inconsistent in showing a relationship. The inverse relationship is expected only because it is thought that educated cohorts commit more time to both electronic and print media which have publicized nuclear energy problems.

Hypothesis 8: Residents in urban areas show more support for radioactive waste cleanup than rural dwellers.

Rationale: Urbanites are generally in closer proximity to hazardous waste sites and support for cleanup of all wastes should be stronger.

Hypothesis 9: There is no relationship between residence and support for nuclear energy.

Rationale: Residents in metropolitan Buffalo may show less support because of the negative image formerly projected by the West Valley site. On the other hand rural residents may show more support for the industry because of employment opportunities at the site.

Hypothesis 10 The general public is environmentally motivated to visit a nuclear waste site.

Rationale: Nuclear waste is an environmental issue with high visibility.

QUANTITATIVE METHODS

Frequency distributions are used to characterize the sample in terms of gender, age, education and residence. Frequency tables are utilized to identify attitudinal tendencies on radioactive waste cleanup and nuclear energy. Regression analysis is performed to produce and control relationships between demographic variables and attitudes on radioactive waste cleanup and nuclear energy. A stepwise regression is performed to arrive at a demographic model of nuclear attitudes.

Crosstabulation of demographic variables and attitudinal responses is also carried out to show tendencies by attitude and population category. Additional frequency distributions are done to find out why people are willing to visit a nuclear waste site, how they learn the most, and who they think should pay the cleanup bill.

DATA

The Sample

The sample consisted of 728 males and 681 females giving the survey a 52% to 48% split between the sexes. All age groups were well represented with about a third the respondents falling in each of the groups shown in Table I. The median age was 40.

Almost 60% of the sample gave an urban residence in the city of Buffalo, its immediate suburbs or in exurban southern Erie County. Over 40% gave their residence as rural Cattaraugus County or more distant areas. In terms of education 45% of those surveyed had either some college or were college graduates. Another 28% listed high school graduation as their highest level attainment. (Table I)

TABLE I

SAMPLE DEMOGRAPHICS

	n	%
Gender		
Males	728	51.7
Females	681	48.3
	1409	100.0
Age		
10 - 29	429	30.4
30 - 49	497	35.3
50+	483	34.3
	1409	100.0
Education		
College Graduate or Some College	632	44.9
High School Graduate	390	27.6
Some High School or Less	387	27.5
	1409	100.0
Residence		
Buffalo City/Suburbs	447	31.7
Southern Erie County	368	26.2
Cattaraugus County and Other Areas	594	42.1
	1409	100.0

TABLE II

PRIORITY ON RADIOACTIVE WASTE CLEANUP

n = 1409

Radioactive Waste Cleanup Is:	n	%
The Most Important Environmental Action of our Time	632	44.9
A High Environmental Priority	710	50.4
Important But Not Immediately Needed	56	4.0
A Waste of Time and Money	11	0.7
	1409	100.0

TABLE III

ATTITUDE ON NUCLEAR ENERGY

n = 1409

Nuclear Energy Is:	n	%
The Best and Most Important Energy Source	207	14.7
A Necessary Energy Source	591	41.9
Acceptable But Dependent on Managing its Wastes	451	32.0
A Technical and Societal Risk	94	6.7
A Mistake in General	66	4.7
	1409	100.0

FINDINGS

Concern for Radioactive Waste Cleanup

The data in Table II make it clear the sample shows a high concern for radioactive waste cleanup. Virtually everyone gives the issue at least high environmental priority status. Almost half indicate that radioactive waste cleanup is the most important environmental action of our time.

One key statistic in Table III reflects the same concern. Almost one-third of the sample characterized nuclear energy as acceptable but dependent on managing its wastes. A little over half the sample felt nuclear energy was either the best energy source or at least necessary. Only about 11 % characterized nuclear power as a risk or mistake.

Demographics and Nuclear Attitudes

Table IV shows regression coefficients indicating the relationships between the demographic variables and the measures of nuclear attitude. Gender was coded such that a strong positive coefficient would indicate a tendency for males to give greater support than females to radioactive waste cleanup or nuclear energy. Conversely, a strong negative coefficient would indicate more support by females on each issue.

Neither coefficient for gender was statistically significant. There would seem to be no relationship between gender and support for radioactive waste cleanup or nuclear energy. Men have traditionally shown greater support for nuclear energy than women. Perhaps this tendency is changing.

TABLE IV

SIMPLE REGRESSION OF DEMOGRAPHIC VARIABLES ON ATTITUDE TOWARD RADIOACTIVE WASTE CLEANUP (RWC) AND NUCLEAR ENERGY (NUC)

n = 1409

Independent Variables	RWC Coefficient	NUC
Gender	.020	-.019
Age	.132*	.129*
Education	.045	-.081*
Residence	.100*	.001

*Significant at .01 level

TABLE V

STEPWISE REGRESSION OF DEMOGRAPHIC MODEL ON ATTITUDE TOWARD RADIOACTIVE WASTE CLEANUP (RWC) AND NUCLEAR ENERGY (NUC)

n = 1409

Independent Variables	RWC Coefficient	NUC
Gender	.003	.033
Age	.162*	.120*
Education	.051	-.101*
Residence	.001	.025
R^2	2.4%	2.7%

*Significant at .01 Level

Table IV, however, clearly indicates a positive relationship between age and support for both radioactive waste cleanup and nuclear energy. Older persons lend more support for nuclear energy than their younger counterparts. This was expected. Older persons are more likely to have formed attitudes about nuclear energy at an earlier time when it was being cast in a positive light by the media and the government.

The positive relationship between age and support for radioactive waste cleanup was a surprise. Perhaps older cohorts have been more influenced by the environmental movement than previously thought.

The coefficients in Table IV indicate a weak positive association between education and support for radioactive waste cleanup. There is a significant inverse relationship between education and support for nuclear energy. Past studies have yielded inconsistent results here. It is reasoned that educated cohorts commit more time to electronic and print media which have publicized nuclear energy problems.

Residence was coded such that positive coefficients would indicate urban support for both radioactive waste cleanup and nuclear energy. No statistical relationship was apparent for residence and nuclear energy; however, a positive coefficient did surface for residence and radioactive cleanup. The closer the sample lived to the metropolitan area, the more support it gave to cleanup. Urbanites are in closer proximity to hazardous waste sites and perhaps concern for those wastes is projected as support for radioactive waste cleanup. However, in the stepwise model this relationship disappeared.

Demographic Model of Nuclear Attitudes

The demographic model in Table V explains only about 2.4 % of the variance in support for radioactive waste cleanup and about 2.7 % of the variance for nuclear energy support. The key variables are age and education. Support for radioactive waste cleanup seems to cut evenly across gender, education levels, and population densities.

TABLE VI

CROSSTABULATION OF DEMOGRAPHIC VARIABLES BY SELECTED RADIOACTIVE WASTE CLEANUP (RWC) AND NUCLEAR ENERGY (NUC) CATEGORIES

n = 1409

	RWC Most Important Environmental Action of our Time	NUC Best and Most Important Energy Source
	%	%
Gender		
Males	44.4	15.9
Females	45.4	13.1
Age		
10 - 29	38.7	10.7
30 - 49	40.4	13.5
50+	55.1	19.5
Education		
College Graduate or Some College	43.0	11.6
High School Graduate	50.8	15.9
Some High School or Less	41.9	18.6
Residence		
Buffalo/Suburbs	47.0	12.5
Southern Erie County	47.0	14.4
Cattaraugus County and Other Areas	42.0	16.5

Radioactive Waste Cleanup - the Most Important Environmental Action of Our Time?

Data in Table VI indicate an even percentage of males and females (45%) think radioactive waste cleanup is the most important environmental action of our time. This lends support to earlier findings which suggest no difference by gender for cleanup support.

The data also indicate that older age cohorts place a higher priority on radioactive waste cleanup as the earlier analysis suggested. Some 55% of those persons over 50 rated radioactive cleanup as the most important action of our time. Only 38% of those persons under 30 gave the issue that high a priority.

There was a tendency for those with higher levels of education to give the cleanup issue a higher status. In terms of residence, 47% of those living in the metropolitan area gave the issue the highest priority while 42% of those people living in the rural areas indicated the same level of support.

Nuclear Energy - The Best and Most Important Energy Source?

Only one out of six of the males sampled felt nuclear power was at the top of the energy spectrum. The response for women was about the same. One in seven gave nuclear energy the highest rating (Table VII).

As expected the positive relationship between age and support for nuclear power is apparent in Table VII. Almost 20% of those respondents over 50 years of age indicated nuclear energy was the best and most important energy source. Only 11% of those under 30 felt so strongly about nuclear power.

The percentages by educational level lend credence to the inverse relationship between education and support for nuclear energy. Support goes down as educational level goes up. With regard to residence, there was a little more support for nuclear as the best energy source in the rural sample.

TABLE VII

FREQUENCY DISTRIBUTIONS FOR SAMPLE VISITING A NUCLEAR WASTE SITE

Motivation to Visit the West Valley Nuclear Waste Site	n	%
Friend Works There	222	15.8
Relative Works There	440	31.2
Interest in Environmental Issues	418	29.7
Interest in Local Issues	123	8.7
Interest in Advanced Technology	206	14.6
	1409	100.0

How the Public Learns the Most About West Valley Nuclear Waste	n	%
Touring the Site	933	66.1
Looking at Exhibits	92	6.5
Talking to Employes	324	23.0
Reading About It	60	4.3
	1409	100.0

Who Should Pay the Cost of Radioactive Cleanup	n	%
Government	250	17.7
Industry	187	13.3
Government and Industry	972	69.0
	1409	100.0

Attitude Change Toward Nuclear Waste Management after Site Visit	n	%
More Positive	790	56.1
Same	575	40.8
More Negative	44	3.1
	1409	100.0

Why are People Interested in Visiting a Nuclear Waste Site?

As Table VII shows sizeable percentage of attendees came to the West Valley site because friends and relatives work there. What is significant, however, is that 30% of the sample responded their motivation to attend was because of an interest in environmental issues. One in seven came because of an interest in advanced technology.

How Does the Public Learn the Most About Nuclear Waste?

Clearly, this sample felt there was no substitute for seeing the real thing. Two-thirds responded that a site tour was the way to learn the most. One in four indicated that talking to employes in the waste management business was the best way to become educated.

Cost of Radioactive Cleanup and Attitude Change

An overwhelming majority (69%) responded that the cost of radioactive cleanup should be a joint effort between industry and government. A majority (56%) indicated that they felt more positive about nuclear waste management after visiting the West Valley Demonstration Project.

LIMITATIONS OF THE STUDY

One consideration is sample bias. With a significant number of site employe friends and relatives, there is a possibility respondents would rate radioactive waste cleanup and nuclear energy differently from a national sample. However, over half of the respondents had no ties to the site and the trend toward cleanup as a high priority was overwhelming. Any bias toward nuclear energy support because of ties to the site would probably be balanced by respondents living in the area who have traditionally viewed the site as problematic.

A second consideration is how different, if any, are those persons who are willing to visit a nuclear waste site from those who are not. There may be attitude differences that only another random sample would uncover. Nevertheless, the sample was taken from a large geographic area and was evenly distributed demographically.

SUMMARY AND CONCLUSIONS

The public sampled here made radioactive waste cleanup a very high environmental priority. Support for nuclear cleanup cut across demographic

groups, however, grew stronger as age increased. A large number of respondents saw the waste issue as crucial to the industry. One third indicated that nuclear energy is acceptable but dependent on managing its wastes.

Support for nuclear energy increased with age. One explanation is that older cohorts formed their attitudes during an earlier time when nuclear power was being touted by the media, while younger cohorts formed attitudes in more recent tumultuous times for the industry. Support for nuclear energy declined with education. It is reasoned that educated cohorts devote more time to the media which have publicized problems of the industry.

There was no significant difference by gender toward radioactive cleanup and nuclear energy. Perhaps male/female differences on nuclear issues are converging. Finally, it appears that a significant percentage of people are environmentally motivated to visit a nuclear waste site and a majority think that visiting a site is the best way to learn more about the issue.

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