

Rural communities and awareness of DOE Environmental Management Programs  
at the Nevada Test Site:  
Do outreach efforts matter? - 9048

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## ABSTRACT

Are residents living in communities around the Nevada Test Site aware of environmental remediation activities and do outreach efforts contribute to awareness? Through a U.S. Department of Energy (DOE) grant, the University of Nevada, Las Vegas administered a mail questionnaire to 14,083 residents and received 1,721 responses. Approximately 90% of the respondents reported awareness of past nuclear tests at the Nevada Test Site; 63% reported awareness of low-level radioactive waste disposal at the site; and 41% are aware that the Yucca Mountain Project for high level waste disposal is part of the Office of Civilian Radioactive Waste Management and not part of the Office of Environmental Management. Using both logit and probit regression models, at a 1% level of significance, respondents who reported obtaining information from the Community Advisory Board for Nevada Test Site Programs are more likely to be knowledgeable about low-level radioactive waste disposal activities and are more likely to be knowledgeable that the missions of the Office of Environmental Management and Office of Civilian Radioactive Waste Management are different.

## INTRODUCTION

Two recent papers by Greenberg, Miller, Frisch and Lewis (2003) [<sup>1</sup>] and Williams and Magsumbol (2006)[<sup>2</sup>] examine the relationship between stakeholders and DOE sites using different methods. Greenberg *et al.* (2003) focus on what is important to rural communities using a combination of secondary data and econometric models around multiple sites rather than primary data. They predict adverse impacts to nearby rural communities when cleanup programs end. In another paper, Williams and Magsumbol (2006) examine the goal of stewardship with residents in 14 states living within 50 miles of a DOE site using a telephone survey. They report using a univariate analysis of variance because "...the criterion variables were not highly correlated" yet do not provide a theory, model or an explanation on why the variables should be analyzed separately. This might be a problem since one might expect different findings for different states and sites. As evidence, Williams and Magsumbol (2006) report mixed results with respect to respondent understanding of the concept of stewardship and preferences for stewardship authorities.

While both papers contribute to a better understanding of the relationship between sites and rural communities, neither of these papers address how awareness of environmental activities might be explained by multiple information sources and public involvement efforts. Finally, neither examine whether there are differences in awareness and preferences across communities around a single site. The purpose of this paper is to examine both of these issues.

## BACKGROUND ON THE NEVADA TEST SITE AND QUESTIONNAIRE

The United States government conducted over 900 nuclear weapons tests above and below ground at the Nevada Test Site between the early 1950s and 1992. Currently, the DOE's Office of Environmental Management Program at the Nevada Site Office is responsible for conducting groundwater, soil, and facility contamination research and remediation that are the result of the historic nuclear testing program. In addition, the program is also responsible for disposing low-level radioactive waste disposal from DOE generators throughout the DOE Complex. The Environmental Management Program at the Nevada Site Office relies on the Community Advisory Board for Nevada Test Site Program (one of the eight advisory boards that make up the Environmental Management Site-Specific Advisory Board) as a vital component of its public outreach initiative.

At the request of and through a U.S. Department of Energy grant, the University of Nevada, Las Vegas administered a mail questionnaire to gain information on the public's perception of Environmental Management activities at the NTS. The questionnaire focused on residents living in rural communities near the Nevada Test Site (NTS) located in southern Nevada. This site was selected to learn more about potentially affected stakeholders who may or may not currently engage in existing outreach efforts.

The following research questions arise:

1. How aware are residents living in surrounding communities of environmental management activities at the NTS?
2. Do public outreach efforts matter with respect to predicting awareness of environmental activities at the NTS?
3. Does residency matter with respect to predicting awareness of environmental activities at the NTS?

A mail questionnaire was developed to answer these questions. The questionnaire was reviewed by the U.S. Department of Energy and the Office of the Protection of Research Subjects at the University of Nevada, Las Vegas and approved in January 2008. Protocol required responses to the questionnaire be kept anonymous and only include individuals 18 or older. To maintain these two requirements in the protocol, individuals who identified themselves or included mailing addresses in the responses were removed from the database used for analyses. AMS, a Las Vegas company, was contracted to label envelopes and only received counts for the different questionnaires sent to each community rather than specific names and addresses. Four of the questionnaires were deleted from the data set because the respondents identified themselves as less than 18 years of age. In March 2008, 6,083 questionnaires were distributed. In May 2008, DOE requested additional communities be included in the questionnaire. Approval was received

from the Office of the Protection to Research Subjects for this change in the protocol. In July 2008, 8,000 additional questionnaires were distributed.

Figure 1 shows all counties in the state of Nevada. This map is based upon Nevada Counties and Land/Status ownership shapefiles downloaded from a U.S. Department of the Interior Bureau of Land Management web site.<sup>[3]</sup> The Land/Status ownership shapefile was used to build the layers containing the Nevada Test Site and Yucca Mountain Project. Figure 2 identifies communities that were sampled with a mail questionnaire in the five (5) southernmost counties of Esmeralda, Nye, White Pine, Lincoln and Clark. This map is based upon the same shapefiles described for Figure 1 as well as an additional shapefile on major Cities and Towns created by Ron Hess at the University of Nevada, Reno. <sup>[4]</sup>

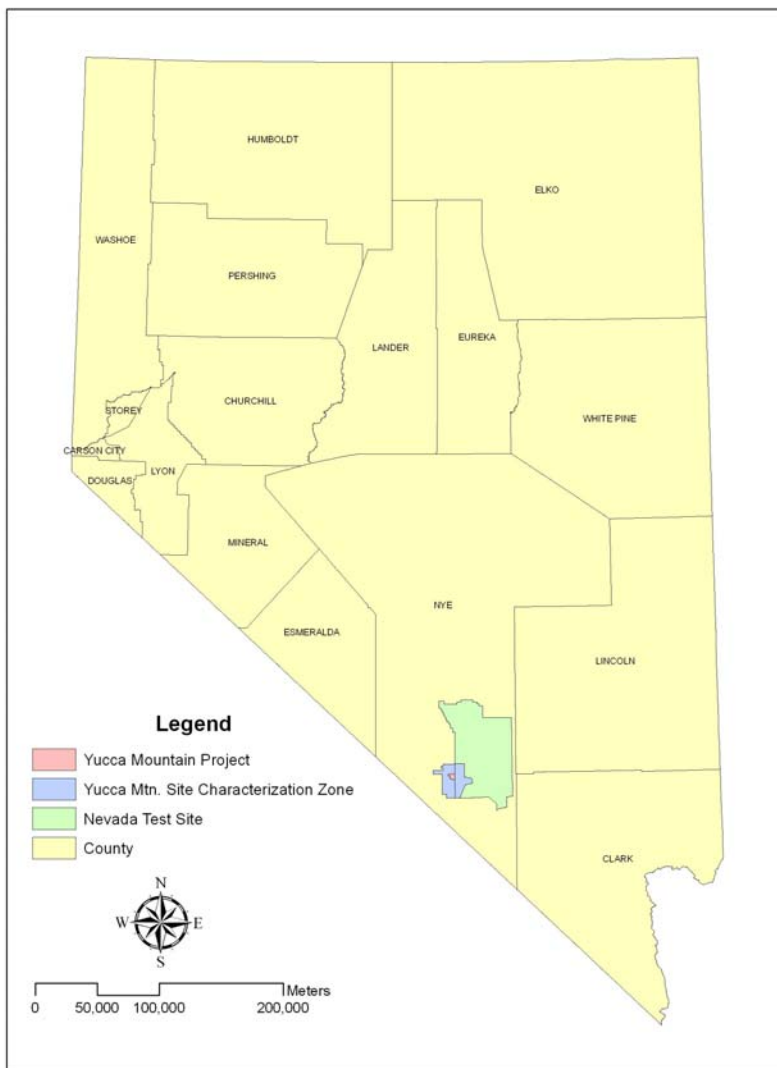


Figure 1: Counties in the State of Nevada

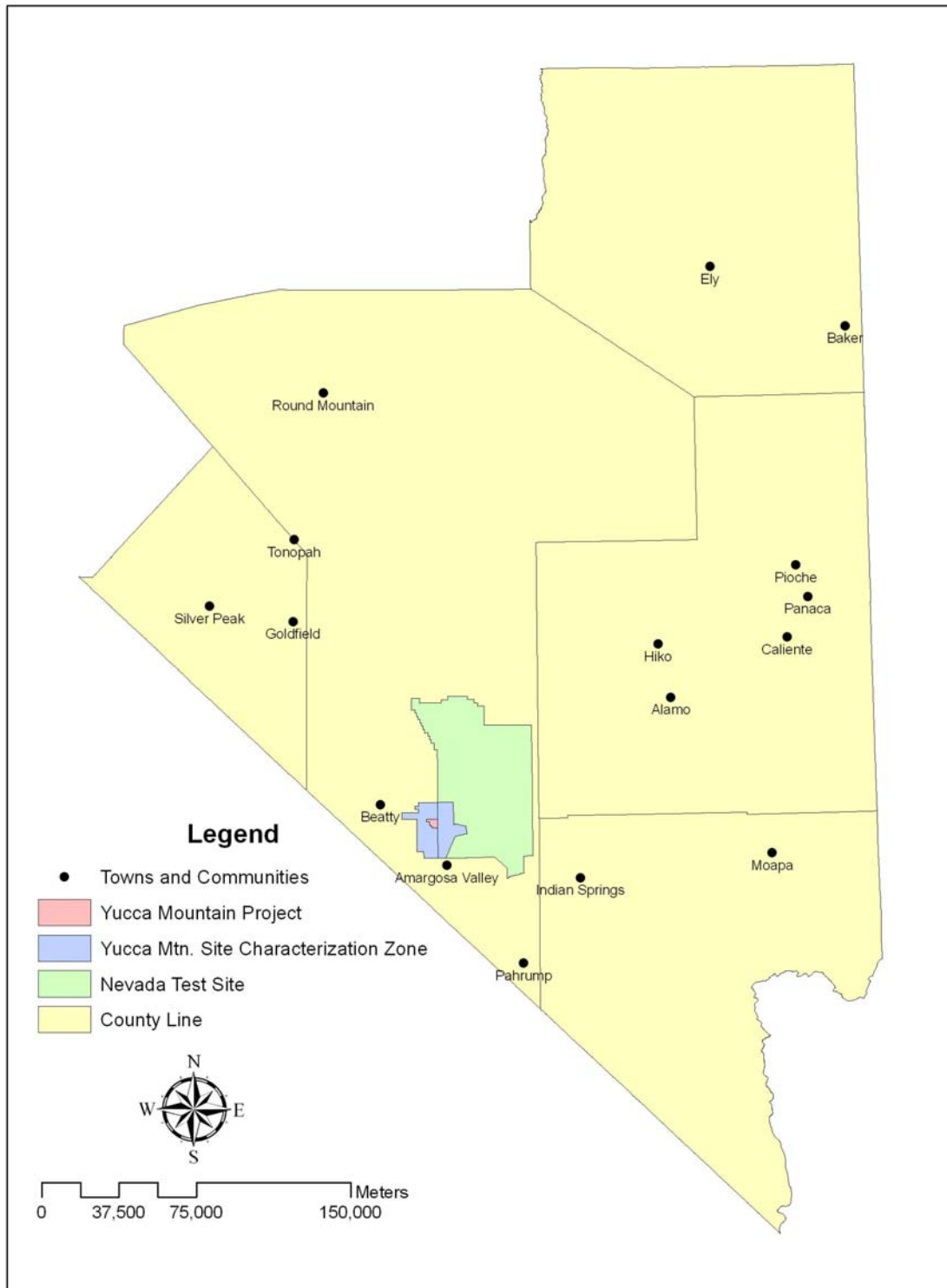


Figure 2: Communities sampled near the Nevada Test Site

DATA

A total of 14,083 questionnaires were sent to residents living near the NTS and 1,721 questionnaires were completed. Table 1 provides the number of questionnaires sent and received by each community where community is defined by zip code. The table also provides percentages of total sent, where Mailing Group A indicates the questionnaires were sent in March 2008 and Mailing Group B indicates the questionnaires were sent in July 2008. Table 1 also provides percentage of total responses received and percent return. Overall the percent return was 12.2%.

Table 1: Number of questionnaires sent and received by community

Community	Number Sent = N	Percent of Total Sent = (N/14,083) *100 (%)	Mailing Group	Number of responses Received = R	Percent of Total responses Received = R/1721* 100 (%)	Percent responses received from community = R/N*100 (%)
Alamo, 89001	430	3.1	A	77	4.5	17.9
Amargosa Valley, 89020	514	3.7	A	87	5.1	16.9
Baker, 89311	30	0.2	B	7	0.4	23.3
Beatty, 89003	702	5.0	A	104	6.0	14.8
Caliente, 89008	578	4.1	A	99	5.8	17.1
Duckwater, 89314	2	0.0	B	0	0.0	0.0
Dyer, 89010	64	0.5	B	10	0.6	15.6
Ely, 89301	751	5.3	B	51	3.0	6.8
Goldfield, 89013	245	1.7	A	30	1.7	12.2
Hiko, 89017	74	0.5	A	25	1.5	33.8
Indian Springs, 89018	688	4.9	A	66	3.8	9.6
Mesquite, 89027	912	6.5	B	93	5.4	10.2
Mesquite, 89034	225	1.6	B	36	2.1	16.0
Moapa, 89025	489	3.5	A	37	2.1	7.6
Pahrump, 89041	1453	10.4	B	47	2.7	3.2
Pahrump, 89048	2503	17.8	B	339	19.7	13.5
Pahrump, 89060	1241	8.8	B	141	8.2	11.4
Pahrump, 89061	766	5.5	B	92	5.3	12.0
Panaca, 89042	393	2.8	A	62	3.6	15.8
Pioche, 89043	663	4.7	A	83	4.8	12.5
Silver Peak, 89047	63	0.4	B	4	0.2	6.3
Tonopah, 89049	1297	9.2	B	153	8.9	11.8
Zip different from mail address	0			26	1.5	n/a
Zip not provided	0			52	3.0	n/a
Total	14083	100.0		1721	100.0	12.2

Table 2 presents the questions from the questionnaire, variable names and brief summary information on percentage responding yes, no, unsure, and missing. The summary tables show that the majority of the respondents are aware of past nuclear tests (89%), environmental programs (63%) and low level waste disposal (58%). Fewer respondents are aware that the Yucca Mountain Project is in the Office of Civilian Radioactive Waste Management (40%). With respect to importance of environmental issues, the majority of the respondents picked in descending order radioactive groundwater contamination (76%), transportation of low-level radioactive waste (33%), soil contamination (28%), and low level radioactive waste disposal (22%). About 31% of the respondents selected more than one environmental issue.

Table 2: Questions from questionnaire, variable names, and percent responses

	Question	Variable	Pctn Yes	Pctn No	Pctn Unsure	Pctn Miss
1	As part of our nation's defense programs, the U.S. government conducted over 900 nuclear tests above and below ground at the Nevada Test Site between the early 1950s and 1992. Were you aware of the Nevada Test Site's past nuclear weapons production and testing?	aware_nts	89.2	10.5	n/a	0.4
2	The U. S. Department of Energy supports work at the Nevada Test Site and throughout its complex on environmental issues from past nuclear weapons production. Were you aware of these environmental programs?	aware_em	63.3	36.1	n/a	0.6
3	The U.S. Department of Energy has multiple environmental missions at the Nevada Test Site. Did you know that the Yucca Mountain Project is part of the Office of Civilian Radioactive Waste Management and not part of the Office of Environmental Management?	aware_ym	40.4	59.0	n/a	0.6
5	The U.S. Department of Energy receives low-level radioactive waste from multiple Federal sites across the country and disposes it in engineered pits and trenches at the Nevada Test Site. Were you aware that DOE disposes low-level radioactive waste at the Nevada Test Site?	aware_lld	57.9	38.8	2.3	1.1
6	To continue to protect the public health and the environment, the U.S. Department of Energy supports research on groundwater contamination, low-level radioactive waste disposal, soil contamination, and transportation of low-level nuclear waste. Which of these environmental issues do you think is the most important to you and your community today? Soil contamination	env_soil1	27.8	72.2	n/a	n/a
6	To continue to protect...to your community today? Low-level radioactive waste disposal	env_llradwaste1	21.7	78.3	n/a	n/a
6	To continue to protect...to your community today? Radioactive contamination of the groundwater	env_gw1	76.1	23.9	n/a	n/a

	Question	Variable	Pctn Yes	Pctn No	Pctn Unsure	Pctn Miss
6	To continue to protect...to your community today? Transportation of nuclear waste	env_transport1	32.5	67.5	n/a	n/a
6	To continue to protect...to your community today? Multiple environmental issues	mult_env_issu es	31.4	68.6	n/a	n/a
7	I have taken a tour of the Nevada Test Site.	tour_nts	27.5	71.9	0.5	n/a
8	I have attended or participated in a meeting about the environmental issues at Nevada Test Site in the past 5 years.	mtg_att	18.1	81.3	0.5	n/a
9	Have you or any members of your family including spouses, children, siblings, parents or grandparents worked at the Nevada Test Site?	work_nts	30.6	68.9	0.5	n/a
10	Where do you get your information regarding the Nevada Test Site? Television	info_tv1	76.8	23.2	n/a	n/a
10	Where do you get your information ...? Newspaper	info_pap1	76.1	23.9	n/a	n/a
10	Where do you get your information ...? Radio	info_rad1	33.5	66.5	n/a	n/a
10	Where do you get your information ...? Internet	info_www1	30.2	69.7	n/a	n/a
10	Where do you get your information ...? Books	info_books1	19.0	81.0	n/a	n/a
10	Where do you get your information ...? State of Nevada	info_statenv1	20.3	79.7	n/a	n/a
10	Where do you get your information ...? Department of Energy	info_doe1	15.2	84.8	n/a	n/a
10	Where do you get your information ...? Nevada Test Site Community Advisory Board	info_cab1	8.9	91.1	n/a	n/a
10	Where do you get your information ...? Environmental Organization	info_envorg1	12.1	87.9	n/a	n/a
10	Where do you get your information ...? Other	info_other1	32.5	67.5	n/a	n/a
11	Listed below are some environmental tasks DOE works on at the Nevada Test Site. Please indicate whether you feel that each task should NOT be a priority, should be given a LOW priority, MEDIUM priority, HIGH priority or UNSURE.		n/a	n/a	n/a	n/a
11a	Efforts to protect the public health and the environment of people living in the rural communities near the Nevada Test Site: high priority	cureffhp	88.3	n/a	n/a	n/a
11b	Efforts to reduce long-term radiation risks to future generations: high priority	lreffhp	84.5	n/a	n/a	n/a
12	I live in a (a) rural area	rural	86.5	n/a	n/a	n/a
13	The zip code where I live is	community	95.5	n/a	n/a	n/a
14	How long have you lived in your neighborhood (town or city)? (c) over 16 years	time_over16	36.4	n/a	n/a	n/a
15	What is the highest level of education you have completed? (a) less than high school	educ_highless	1.7	n/a	n/a	n/a

	Question	Variable	Pctn Yes	Pctn No	Pctn Unsure	Pctn Miss
15	What is the highest level of education you have completed? (b) high school	educ_high	19.9	n/a	n/a	n/a
16	What is your age? (a) less than 18 years	age_less18	n/a	n/a	n/a	n/a
16	What is your age? (d) 46 to 65 years	age_46_65	47.5	n/a	n/a	n/a
16	What is your age? (e) 65 + years	age_65_plus	36.2	n/a	n/a	n/a
17	What is your gender? (a) female	female	46.3	52.5	n/a	1.2
18	My family's main source of income is from (b) annual salary	inc_annsalary	15.5	n/a	n/a	n/a
18	My family's main source of income is from (c) retirement	inc_ret	45.9	n/a	n/a	n/a
19	Do you belong to an environmental organization?	env_org	6.6	92.0	1.4	n/a
20	Comments? Please write suggestions below that could help us improve this questionnaire or provide feedback to the Department of Energy regarding environmental issues at the Nevada Test Site.	comm_dum	36.2	65.8	n/a	n/a

## STATISTICAL METHODS

In addition to sample size and percentage responses, we use both univariate and multivariate statistics to answer our three research questions. Given most of the data are categorical data, a chi-square test was used for univariate tests. The general null hypothesis is based upon Moore (p. 544) that “there is no relationship between two categorical variables” while the alternative hypothesis is that there is a relationship between two categorical variables.<sup>5</sup>

Based on the research questions 2 and 3, the main hypothesis tests for this paper are as follows:

Ho1: There is no relationship between community and environmental awareness.

Ha1: There is a relationship between community and environmental awareness.

Ho2: There is no relationship between outreach activities and environmental awareness.

Ha2: There is a relationship between outreach activities and environmental awareness.

According to Moore (p. 538) the chi-square test “...is the overall test for detecting relationships between two categorical variables. If the test is significant, it is important to look at the data to learn the nature of the relationship.”

To examine the relationships further while controlling for multiple explanatory variables, both a logit model and a probit model were used to test the hypotheses. The logit regression model is based upon a logistic cumulative distribution function while the probit model is based upon a normal cumulative distribution function. See Gujarati [<sup>6</sup>] and Pindyck and Rubinfeld [<sup>7</sup>] for



descriptions on binary choice models and mathematical assumptions of each model. Rather than select one over the other, results are reported for both the Logit and Probit Models.

We constructed the following general model to answer the research questions.

$$\text{Awareness} = f(\text{socioeconomic characteristics, information sources, community}) \quad (\text{Eq. 1})$$

Multivariate analyses were narrowed to two (2) dependent variables, aware\_ym and aware\_lld.

## RESULTS

Table 3 presents multiple chi-square tests. With respect to the general relationship between community and awareness, the null hypothesis is rejected for all four measures of awareness. With respect to the secondary relationship between community and environmental issue, the results are mixed. The null hypotheses that there is no relationship between the CAB and other public involvement efforts such as mtg\_att and info\_doe1 are rejected. As for the general relationship between outreach efforts and awareness, all four null hypotheses are rejected. These relationships are examined further with the regression models in Tables 4 and 5.

Table 3: Summary of chi-square tests

Categorical variable 1	Categorical variable 2	DF	chi-square value	Prob	Significance
Community	aware_nts	19	46.74	0.0004	***
Community	aware_em	19	54.36	0.0001	***
Community	aware_ym	19	42.27	0.002	***
Community	aware_lld	38	88.02	0.00	***
Community	env_soil1	19	15.38	0.70	
Community	env_llradwaste1	19	12.57	0.86	
Community	env_gw1	19	45.28	0.00	***
Community	env_transport1	19	34.23	0.02	**
Community	multi_env_issues	19	20.36	0.37	
info_cab1	info_doe1	1	298.33	0.00	***
mtg_att	info_doe1	1	431.42	0.00	***
info_cab1	mtg_att	2	263.86	0.00	***
info_cab1	aware_nts	1	13.89	0.00	***
info_cab1	aware_em	1	44.47	0.00	***
info_cab1	aware_ym	1	66.61	0.00	***
info_cab1	aware_lld	2	53.45	0.00	***

\*\* Significant at the 5% level.

\*\*\* Significant at the 1% level.

Footnote to Table 3: The sample size for these tests were reduced to an effective sample size of 1489 given missing values and rural=1.

In table 4 regression results are reported for aware\_ym using both logit and probit models. Both an unrestricted model (including many different explanatory variables) and a restricted model (with only a few explanatory variables) are presented, given the null hypotheses in Table 3 was rejected since there is no relationship between info\_cab1, mtg\_att and info\_doe1. The unrestricted models outperform the restricted models while the results are consistent for all four (4) regressions that info\_cab1 is both positive and significant at the 5% and 1% levels. Therefore, respondents who indicate that they get information from the Community Advisory Board for Nevada Test Site Programs are more likely to be aware of the different missions for the Office of Environmental Management and Office of Civilian Waste Management. With respect to community and awareness, most communities fail to reject the null hypothesis. As a result, different communities do not appear to be more or less likely aware of the different missions. As for female coefficient, it is negative and significant at the 1% level.

Table 4: Regression results where aware\_ym is the dependent variable

Model	1	2	3	4
Method	Logit	Logit	Probit	Probit
Intercept	-1.498 ( 0.289)***	-0.629 ( 0.095)***	-0.906 ( 0.173)***	-0.389 ( 0.058)***
female	-0.423 ( 0.119)***	-0.463 ( 0.107)***	-0.255 ( 0.072)***	-0.286 ( 0.065)***
age_65_plu	0.395 ( 0.218)*	0.006 ( 0.111)	0.231 ( 0.130)*	0.005 ( 0.067)
rural	0.046 ( 0.185)	. ( . )	0.027 ( 0.111)	. ( . )
time_over1	0.190 ( 0.128)	. ( . )	0.112 ( 0.077)	. ( . )
tour_NTS	0.650 ( 0.135)***	0.940 ( 0.118)***	0.398 ( 0.082)***	0.575 ( 0.072)***
educ_high1	-0.206 ( 0.476)	. ( . )	-0.116 ( 0.287)	. ( . )
work_nts	0.170 ( 0.108)	0.187 ( 0.101)*	0.110 ( 0.065)*	0.115 ( 0.059)**
educ_high	-0.090 ( 0.151)	. ( . )	-0.056 ( 0.090)	. ( . )
info_cab1	0.539 ( 0.230)**	1.201 ( 0.198)***	0.314 ( 0.138)**	0.735 ( 0.118)***
age_46_65	0.295 ( 0.176)*	. ( . )	0.174 ( 0.105)*	. ( . )
env_group	-0.238 ( 0.244)	. ( . )	-0.148 ( 0.147)	. ( . )
inc_annsal	0.256	.	0.161	.

	( 0.172)	( . )	( 0.104)	( . )
inc_ret	0.052	.	0.032	.
	( 0.153)	( . )	( 0.093)	( . )
mtg_att	0.037	.	0.024	.
	( 0.163)	( . )	( 0.099)	( . )
info_tv1	-0.006	.	-0.010	.
	( 0.154)	( . )	( 0.092)	( . )
info_pap1	-0.052	.	-0.028	.
	( 0.152)	( . )	( 0.091)	( . )
info_rad1	0.114	.	0.067	.
	( 0.129)	( . )	( 0.078)	( . )
info_www1	0.378	.	0.223	.
	( 0.131)***	( . )	( 0.079)***	( . )
info_books	0.206	.	0.123	.
	( 0.152)	( . )	( 0.092)	( . )
info_state	0.464	.	0.280	.
	( 0.153)***	( . )	( 0.093)***	( . )
info_doe1	0.740	.	0.445	.
	( 0.196)***	( . )	( 0.118)***	( . )
info_envor	0.269	.	0.173	.
	( 0.195)	( . )	( 0.118)	( . )
info_other	0.618	.	0.372	.
	( 0.127)***	( . )	( 0.076)***	( . )
amargosa_v	0.212	.	0.121	.
	( 0.259)	( . )	( 0.156)	( . )
beatty	0.149	.	0.083	.
	( 0.240)	( . )	( 0.145)	( . )
caliente	-0.300	.	-0.189	.
	( 0.252)	( . )	( 0.150)	( . )
pahrump	-0.059	.	-0.038	.
	( 0.130)	( . )	( 0.078)	( . )
AIC int only	2119	2250		
AIC int & cov	1901	2082		
Log Likelihood			-922.3	-1035

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Standard errors in parentheses.

\* Significant at the 10% level.

\*\* Significant at the 5% level.

\*\*\* Significant at the 1% level.

In table 5, regression results are reported for aware\_1ld using both logit and probit models. Like previously mentioned, the info\_cab1 is positive and significant at the 5% and 1% levels for all four (4) regressions. This means that people who get information from the Community Advisory Board for Nevada Test Site Programs are more likely to be aware of low-level waste disposal

activities at the NTS. With respect to community, only Caliente is negative and significant. This means that respondents from Caliente are less likely to know about low-level waste disposal activities at the NTS at the 1% level of significance. This might be explained by the current focus in Caliente on high-level nuclear waste issues rather than low-level radioactive waste disposal. Other factors that are positive and significant are those individuals who have taken tours of the NTS, lived in the area over 16 years and respondents over 65. Factors that are negative and significant are female, meaning women are less likely to be aware about low-level radioactive waste disposal at the NTS.

Table 5: Regression results where aware\_llid is the dependent variable

Model	1	2	3	4
Method	Logit	Logit	Probit	Probit
Intercept	-6.363 ( 0.367)***	-4.851 ( 0.218)***	-3.235 ( 0.186)***	-2.480 ( 0.094)***
Intercept	-1.266 ( 0.283)***	0.054 ( 0.094)	-3.235 ( 0.186)***	-2.480 ( 0.094)***
Intercept2	.	.	2.609 ( 0.085)***	2.545 ( 0.081)***
female	-0.531 ( 0.117)***	-0.537 ( 0.107)***	-0.297 ( 0.068)***	-0.298 ( 0.063)***
age_65_plu	0.373 ( 0.211)*	0.242 ( 0.111)**	0.187 ( 0.122)	0.151 ( 0.065)**
rural	0.611 ( 0.180)***	.	0.343 ( 0.106)***	.
time_over1	0.222 ( 0.129)*	.	0.113 ( 0.074)	.
tour_NTS	1.023 ( 0.152)***	1.358 ( 0.137)***	0.519 ( 0.081)***	0.693 ( 0.072)***
educ_high1	-0.236 ( 0.429)	.	-0.097 ( 0.249)	.
work_nts	0.446 ( 0.110)***	0.511 ( 0.101)***	0.227 ( 0.063)***	0.266 ( 0.058)***
educ_high	-0.151 ( 0.146)	.	-0.059 ( 0.085)	.
info_cab1	0.619 ( 0.249)**	0.964 ( 0.217)***	0.311 ( 0.133)**	0.478 ( 0.114)***
age_46_65	0.076 ( 0.169)	.	0.023 ( 0.099)	.
env_group	-0.045 ( 0.242)	.	-0.041 ( 0.140)	.
inc_ansal	-0.172 ( 0.170)	.	-0.124 ( 0.099)	.
inc_ret	0.117	.	0.074	.

	( 0.151)	( . )	( 0.087)	( . )
mtg_att	0.360	.	0.199	.
	( 0.176)**	( . )	( 0.096)**	( . )
info_tv1	0.026	.	-0.030	.
	( 0.151)	( . )	( 0.087)	( . )
info_pap1	0.418	.	0.259	.
	( 0.148)***	( . )	( 0.086)***	( . )
info_rad1	0.073	.	0.023	.
	( 0.128)	( . )	( 0.074)	( . )
info_www1	0.169	.	0.082	.
	( 0.131)	( . )	( 0.076)	( . )
info_books	0.383	.	0.188	.
	( 0.158)**	( . )	( 0.089)**	( . )
info_state	0.138	.	0.058	.
	( 0.159)	( . )	( 0.091)	( . )
info_doe1	0.221	.	0.107	.
	( 0.212)	( . )	( 0.115)	( . )
info_envor	-0.229	.	-0.108	.
	( 0.195)	( . )	( 0.112)	( . )
info_other	0.659	.	0.346	.
	( 0.129)***	( . )	( 0.073)***	( . )
amargosa_v	-0.050	.	-0.035	.
	( 0.267)	( . )	( 0.151)	( . )
beatty	0.385	.	0.208	.
	( 0.248)	( . )	( 0.139)	( . )
caliente	-0.733	.	-0.427	.
	( 0.250)***	( . )	( 0.146)***	( . )
pahrump	0.016	.	0.043	.
	( 0.127)	( . )	( 0.073)	( . )
AIC int only	2372	2083		
AIC int & cov	2524	2262		
Log Likelihood			-1036	-1142

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Standard errors in parentheses.

\* Significant at the 10% level.

\*\* Significant at the 5% level.

\*\*\* Significant at the 1% level.

## DISCUSSION

It is important to recognize that there is a potential response bias given only approximately 12% responded to the questionnaire, which may limit the ability to generalize the findings to all residents living around the NTS. Given the sensitivity of the subject matter, the strict human subject committee protocol was followed which meant the questionnaire was anonymous, no tracking was performed on who responded and those who did not respond. As a result, there was no mechanism to send reminders to those who did not respond.

In some geographic areas, questionnaires were distributed to all households in the database. Others areas, such as Pahrump which has experienced tremendous growth over the past 20 years, were sampled randomly.

Finally, while the questionnaire was only 21 questions and four (4) pages long the tables and analyses to the data analyzed was limited to answer the three research questions. The questionnaire also included additional information on environmental priorities and preferences which researchers plan to focus on in future reports and papers.

## CONCLUSION

The purpose of this paper is to examine whether information sources and public involvement efforts impact awareness of environmental activities while controlling for multiple socioeconomic characteristics and communities around a single site, the NTS. A total of 14,083 questionnaires were distributed by mail and 1,721 responses were received. Simple statistics as well as test hypotheses on awareness of activities at the NTS and importance of environmental issues to stakeholders using both univariate and multivariate tests are reported. Overall respondents who report obtaining information from the Community Advisory Board for Nevada Test Site Program are more likely to be knowledgeable about low-level radioactive waste disposal activities and are more likely to be knowledgeable about the mission of the Office of Environmental Management versus the Office of Civilian Waste Management with respect to the Yucca Mountain Project. It is planned for researchers to examine the relationship between communities and environmental priorities at the NTS.

Keywords: Rural communities, Environmental Management, Nevada Test Site, public involvement, citizens

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<sup>1</sup> Greenberg, Michael, K. Tyler Miller, Michael Frisch and David Lewis, Facing an Uncertain Economic Future: Environmental Management Spending and Rural Regions Surrounding the U.S. DOE's Nuclear Weapons Facilities, [Defense] and Peace Economics, 2003, Vol. 14(1), pp. 85-97 [hereinafter GREENBURG ET AL] at p. 85.

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