Native Perception of the Yucca’n Nuclear Waste Conversation

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Abstract

This paper focuses on how environmental justice, the media, and science influences perception of the proposed high-level radioactive nuclear waste repository at Yucca Mountain. The focus of the thesis is not to talk about whether nuclear power is good or bad, but to talk about the wastes and environmental justices that come with it. The last thing this thesis tries to do is find a way to bridge the gap between the government and the public - specifically the Native American population - on ways to better go about decision-making processes. The findings state that the government did not go about the decision-making process in the most equitable way and a way to improve this is by participating in more participatory science that then influences the media, the government, and the public. Questions for future study ask about the role of Native sovereign nations and power compared to the government on resources.

Key Words: Yucca Mountain, nuclear waste, decision-making process, environmental justice
Preface

I originally took interest in the topic of Yucca Mountain and community participation because I am deeply interested in the topic of environmental justice and I believe that diverse dialogue about what to do with our environmental choices is necessary; if we continue to marginalize voices, real solutions will not be found for our environmental woes. I chose to focus on Native American issues in Nevada because this is where my family is located and I am a part of the Western Shoshone Tribe. Nuclear waste was not a topic I had originally thought of, but when considering issues close to my family, I saw that this topic was very controversial. The use of Yucca Mountain as a nuclear waste repository seemed to be most influenced by the president at the time, and not the people. Though Obama had killed the Yucca Nuclear Repository plan in his term, President Trump stated that the Yucca Mountain repository was something he was going to support. I thought this was very interesting in understanding where power lies. I am curious about community participation because I think understanding why people get involved is incredibly important when talking about the outcome of any decision being made. The talk of our future energy sources and how people view these subjects are important. I hope that the research I do can shed light on the importance of community participation in decision-making around issues such as nuclear waste management. I also hope that my findings can be given to local organizations in Nevada dealing with communication around these issues.
Introduction

We have entered a period of time where the energy choices we make and how we chose to impact people and the environment from said choices is becoming incredibly important due to climate change. We have also entered a time where conversations about environmental issues and social justice issues are more popular in conversation now than they have been before. This thesis focuses on the analysis of the decision of Yucca Mountain as a repository for the nation’s nuclear waste. Yucca Mountain, nestled in Nye County of Nevada, is as much a topic of waste management as it is a topic of environmental justice. This research focuses on the following research questions:

Research Question 1: Based on the Science and the nature of nuclear power, what does the science say about nuclear power from cradle to grave? What are environmental justice fears?

Research Question 2: Based on literature, which aspects of science, media, and environmental justice influenced perception, and thus participation, in the planned Yucca Mountain nuclear waste disposal site focusing mainly on a Native American perspective?

Research Question 3: Based on survey data and literature, how influential does the community feel when participating, and is there a way to bridge the gap between science,
the government, and the people to educate and empower local participation so that the decision making-process may take into account a wider variety of voices?

This thesis does not seek to understand whether nuclear power is good or bad. This thesis seeks to understand perceptions of high-level nuclear waste and whether all voices were considered in the decision-making process. I focus mostly on Native American voices and interpretations. Moreover, I want to understand how the public gains information about the issues affecting their community and why they value the things that they do (and how this bleeds into participation). By understanding community participation and how decisions are being made, this thesis could be of use to organizations trying to lessen the gap between the community and the decisions being made for them. This thesis could also be offer a new way to value our energy sources through the mindset of indigenous leadership.

Background

Nuclear power began as a non-peaceful endeavor of war but when President Eisenhower gave a speech called Atoms for Peace, the conversation focused on using nuclear power as a cheap source of energy (Greenberg, 2013). Nuclear power got a lot of support because there are no carbon emissions from the use of the fuel (VujiA et al., 2012). The downside was the waste that was created from nuclear power which is both radioactive and destined to live thousands of years before it is meant to decay again. When nuclear power is made, it creates high-level nuclear waste that needs to be stored somewhere. The nation has been in controversy over a site
chosen in Nevada called Yucca Mountain. Yucca Mountain got a lot of support under the Bush presidency and this is when a lot of the headway for the project happened. This project then lost support under the Obama presidency. Although President Obama supported nuclear power, he did not support nuclear waste at Yucca Mountain and the plan had died for a time under his presidency (Greenberg 2013; 2014; 2012; 2015). When Trump became president, the issue was revived as he told the media that he supported Yucca Mountain becoming a nuclear waste facility (Cama, 2017). It was in the Nuclear Waste Policy Act of 1982, which was amended in 1987, where Yucca Mountain was chosen as the sole candidate to be studied (Greenberg, 2012; Cotton, 2006; Murphy, 2006; Hanks, 2001). This decision was originally made U.S. Research and Development Administration because of its history of underground nuclear testing (Hanks, 2001). When this amendment was put into place, the bill began to be known as and referred to as the “Screw Nevada Bill”, (Cotton, 2006; Houston, 2013; US Dept of Energy, 2002).

Yucca Mountain is located 90 miles north of Las Vegas and is a location proposal that is under huge controversy. There are sites around the United States that store lower level to intermediate-level wastes, for example the WIPP in New Mexico, but none that would store the more dangerous and longer-term radioactive nuclear wastes that are planned for Yucca Mountain (Timm & Fox, 2011).

Yucca Mountain today is a 5-mile “exploratory tunnel”. 75,000 ft. of the mountains core has been extracted and 18,000 water samples have been taken. From 2001 to 2007, the act of obtaining the license necessary to create the repository 1000 ft. above water and 1000 ft. below desert floor was obtained. This project thus far has cost the government over 10.5 million dollars (Houston, 2013) and it is projected to cost about 100 billion when adding in clean-up costs for
the DOE (Greenberg, 2015). The decision to consider Yucca Mountain as a nuclear waste facility involved many different constituents. The experts working on the science are just as important as the community members who may be affected (Krütli et al., 2010).

There is controversy over the decision-making process that allowed for Yucca Mountain to become the sole location for the nation’s nuclear waste. While scientific criteria is meant to guide where to store our nation’s nuclear waste there are other environmental, social, and economic factors that have been and continue to influence this decision today (Cotton, 2006). In all the research and history that I have looked up, I found that there seems to be a lack of communication between the decisions being made and what the people want.

There are many factors on why people may or may not want nuclear waste in their communities. For example, some people chose to allow nuclear waste to be present because they are choosing between nuclear waste and poverty (Hiesinger, 2002). Some people get financial stability and jobs out of this. This conversation is painted with the rhetoric of environmental justice, science, and political participation of the people. I focus heavily on a Native American perspective since these voices often get marginalized.

The Nature of the Resource - Nuclear Power from Cradle to Grave

Nuclear power is a cradle to grave type of energy resource (Enders, 2009; Adeola, 2012). This means that it is a type of energy that creates waste that cannot be used for any sort of benefit when it is expelled (Adeola, 2012). This section of the thesis will map the life span of nuclear power from mining to waste. The process to create nuclear energy begins from the mining of uranium. This happens in mostly the western hemisphere (see figure 1 below). Uranium is not
explicitly dangerous, but it is categorized in the same hemisphere as lead and is treated with many precautions. Most of the most danger when it comes to mining is the ore that is found around uranium; the ore is created by uranium’s decaying properties. The health issues that could arise from this, if faced with too much exposure, is lung cancer (World Nuclear Association Website).

After uranium is mined, it is shipped to the eastern side of the United States to be used in nuclear power plants (please see figure 2 below). There are 99 operating nuclear power plants in
the USA (US Nuclear Regulatory Commission, 2017). In 2011, there used to be 104 (US Nuclear Regulatory Commission, 2011 as cited by Greenberg 2013). This is where most of radioactive nuclear waste comes from (World Nuclear Association Website). This is also where the most benefit of Nuclear power is going both in the form benefiting from the use of energy and benefiting from jobs from these facilities (Gawande, 2001).

![DOE 2008 Representative Transportation Routes to Yucca Mountain and Transportation Impacts (Cask Shipments by State)](image)

The last stage of the nuclear power story is in the form of nuclear waste. There are 2 different types of nuclear waste disposal options that are more accepted than other choices: near surface disposal and deep-geological disposal, so I will only talk about those in my paper here.

Near-surface disposal is for low-level radioactive waste and short-lived intermediate-level radioactive waste. Deep-geological disposal is for long-lived intermediate-level radioactive waste and high-level radioactive waste (World Nuclear Association Website). Disposing of
waste in a geological matter is what most scientist deem as the safest option (Macfarlane & Ewing, 2006). There is still much uncertainty because of the amount of time in which the high-level radioactive waste is to be in the ground, there are many influences that humans cannot predict. The 2002 Environmental Impact Statement for Yucca Mountain stated that the most contamination would be 400 to 600 thousand years after closure of the site (Murphy, 2006). Right now, low level waste is being stored in 5 places in the United States in near-surface facilities located in Texas, South Carolina, Utah, Tennessee, and Washington (World Nuclear Association Website). Intermediate-level nuclear waste is mostly being stored in New Mexico in a facility called the Waste Isolation Pilot Plan (WIPP) facility. This facility was not meant to be a long-term solution to our nuclear waste issue, but it is finding itself forced to be (Timm & Fox, 2011). The rest of the nuclear waste is being stranded where the nuclear power plants are, and this can be very dangerous due to how much of these places are not built for holding waste (Hanks, 2001).

A huge proponent of this cradle to grave story is transportation. Not all of what is transported is dangerous, only what is held in large Type B casks (see figure 3 below). These Type B casks are created for safe transportation of the high-level radioactive waste. Transportation is one of the biggest fears when it comes to the story of nuclear power and the high-level radioactive waste it creates. This means if Yucca Mountain is to be used as a nuclear waste repository, transportation is an important topic for discussion (Trouset et al., 2015). Moving nuclear waste requires it to travel through communities where millions of people in over 35 states (Treichel, 2017). There is fear of accidents during transportation (Perlaviciute and Steg, 2014). Most routes are freight trains and you can see this in a visual representation in figure 2.
Property near nuclear waste can become stigmatized and lose value and people are less likely to
vacation to an area that is correlated with nuclear images or that live close to where shipments
are happening (Gawande & Jenkins-Smith, 2001; Greenberg, 2012). Once this waste gets
transported to, say, Yucca Mountain, the canisters need to change to something that can undergo
a geological depository environment (Hanks, 2001).

Safety is something that are on the minds of many of the key actors. An example of this
is the Community Environmental Monitoring Program (CEMP) that monitors nuclear risks
(Shafer & Hartwell, 2011). These CEMP uses technology to warn people of the possible dangers
associated with an area. This technology is put in very visible locations so that it is also acts as
an awareness mechanism.

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*Figure 3*
Environmental Justice in the United States

The term environmental justice was coined in the 1990’s and has been more widely used today than before. Environmental justice issues have been largely ignored by our society in the past (Bullard, 1990). There have been many ways in which the nation has tried to address this issue, but there is more work to be done (NIH, 2015). In 1991, the first National People of Color Environmental Leadership Summit happened in Washington DC. At this event, 900 leaders came out, 650 of them from multiracial backgrounds from all 50 states, and even some leaders from Chile, Mexico, and Puerto Rico. (Shephard, 2001; Bullard, 2000). They created and adopted 17 principles of environmental justice (Bullard, 2000). In 1992, the Office of Environmental Equity was created later to be renamed the Office of Environmental Justice. The talk about toxic waste began as action that branched off from the Civil Rights Movement and this was due to most of the toxic waste being unjustly located in the neighborhoods where people of color lived and still live today. In the United States, 5 billion metric tons of toxic waste have been improperly disposed of between 1950 & 1975 (Adeola, 2012; Kyne, 2016).

In 1993, the EPA created the National Environmental Justice Advisory Council (NEJAC). This was one of the first times when people affected by these issues, along with grassroots organizations and federal agency representatives, sat together on a planning committee for a conference in Arlington, Virginia to talk about environmental justice. At that time, President Clinton issued Executive Order 12898 that stated that 11 federal agencies were to develop policies and procedures to combat environmental justice issues (Shepard, 2002). Although there were many efforts put forth to solve environmental injustice (see figure 4 below), we continue to see these issues happening across the country still today, and a lot of this injustice
is linked to a class struggle. For example, sometime marginalized communities are so impoverished, some community members seek out these toxic facilities so that money can flow into their communities (Riley et al, 2006).
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>Protest of Warren County, North Carolina, landfill brings national attention to EJ</td>
</tr>
<tr>
<td>1983, 1987</td>
<td>GAO and United Church of Christ document environmental inequities</td>
</tr>
<tr>
<td>1992</td>
<td>EPA establishes Office of Environmental Justice</td>
</tr>
<tr>
<td>1993</td>
<td>EPA creates National Environmental Justice Advisory Council</td>
</tr>
<tr>
<td>1994</td>
<td>NIEHS and other federal bodies host Symposium on Health Research and Needs to Ensure Environmental Justice (leads to creation of the Environmental Justice: Partnerships for Communication program and the Minority Worker Training Program)</td>
</tr>
<tr>
<td>1994</td>
<td>President Clinton issues Executive Order 12898</td>
</tr>
<tr>
<td>1994</td>
<td>NIEHS issues Request for Applications for minority worker training and education programs</td>
</tr>
<tr>
<td>1995</td>
<td>Launch of Interagency Working Group on Environmental Justice</td>
</tr>
<tr>
<td>1995</td>
<td>HHS issues initial Environmental Justice Strategy</td>
</tr>
<tr>
<td>2008</td>
<td>NIEHS establishes the Partnerships for Environmental Public Health program</td>
</tr>
<tr>
<td>2010</td>
<td>President Obama hosts first White House Forum on Environmental Justice</td>
</tr>
<tr>
<td>2011</td>
<td>Memorandum of Understanding on Environmental Justice and Executive Order 12898</td>
</tr>
<tr>
<td>2012</td>
<td>HHS releases “2012 HHS Environmental Justice Strategy and Implementation Plan”</td>
</tr>
<tr>
<td>2012</td>
<td>HHS Environmental Justice Stakeholders Implementation Meeting</td>
</tr>
</tbody>
</table>
Native Americans, along with other minority groups, have been partaking in environmental justice issues from time immemorial. This began when the first Europeans set foot on the America’s and began their colonial trek bringing with them disease and weapons. The loss of land and culture that resulted from this was massive (Vickery & Hunter, 2015). Historically there are many siting’s for LULU’s in marginalized communities, but these communities do not usually hear about until the proposal had already been talked about months to years before (Cole & Foster, 2000; Nussbaum, 2012). For example, Native American tribes were solicited and asked if waste could be disposed of on their land. There are 565 federally recognized tribes and they were asked because they are often too poor to say no (Brook, 1998; Taylor, 2014). This makes them harder to fight if the community decides they do not want them there. The people who have the power to say no to LULU’s are those who have the time, the effort, and the money to put towards keeping these things out of their homes, something that marginalized communities do not have (Vickery 2015).

**Roles and Decision-Making**

In a capitalist country, which the United States is, democracy is a term used to describe a citizen’s rights and responsibilities (Livingstone and Lunt, 1994). When it comes to participating in democratic ways, there are many ways in which people can participate. There are many things that keep people from participating from the benefits and costs associated with political participation, the general level of how politically active an individual is, the networks that mobilize them to participate, and individual socio-economic characteristics of an activity (Trousset et al., 2015; de Groot & Steg, 2010). The nuclear industry, as well as other industries
in the government, have been associated with a top-down approach to decision making
smothered in secrecy and non-transparency and this leads to people not being included in the
appropriate way which then leads to public resistance (Krütli et al., 2010). When participating in
decision-making processes becomes inaccessible, grassroots organizing is often what most
communities turn to.

Community engagement happens when people are listening to or most often experiencing
the issues going on in their community and then try to do something about it (Fitzgerald, 2014;
Trousset et al., 2015). In general, public participation is an ill-defined term because there are
many types of ways people can get involved from the political to the community driven efforts
that make society work (Shafer, 2011). Community engagement can be both on an individual
level and on an organizational level. Since there is no real way to define these efforts, I define
community participation as any action in which an individual is doing more than just getting
educated about the issue.

Grassroots community-based organizations are important in rural areas where civic
engagement creates equitable community development, and the members of these organizations
are often the lifeblood of the US democracy (Willis, 2013). Community is the center of creating
change (Bacon, 2013). The reason why community is so powerful is because they have personal
stake in these issues, and if these issues are not dealt with, community members continue to
suffer. The love and power of a community is why many multicultural individuals join
environmental justice grassroots efforts. Due to family concerns and involvement, community
health, welfare concerns, faith (or spirituality), and environmental racism, community members
choose to step up to act (Gomez, 2011). People get involved in many ways, and many people participate through the telling of stories (Houston, 2013).

Grassroots struggles puts marginalized people versus facility owners and state-owned environmental groups when it comes to decision making (Cole & Foster, 2000). Grassroots efforts also empower people (Krütli et al, 2010). This is often because people are able to practice free speech that seems to challenge the status quo. There are other ways to get involved other than grassroots efforts, but they are a bit less participated in. There is the option to testify. The problem with testifying is that there is not the same media attention as a protest, a march, or something along those lines. Native American leadership, for example, has been more organized than ever (Brook, 1998). Personal norms influence the willingness to take action. Opponents of nuclear waste are more willing to take action than those who do not find issue with the waste. And these actions are done so out of moral considerations (de Groot & Steg, 2010).

There is mention of a cultural theory to participation that states that different people in different cultures will react differently to participation (Trousset et al., 2015).

Methods

Using online literature and a self-administered survey, data was collected to answer the research questions outlined in this thesis. This is important because it allows a look at the discussion of Yucca Mountain in the past and how people still feel about it today. All data is focused on Nevada.
Data Collection from Literature

Many of the online literature looked at are scholarly articles, archives, and studies. I use literature to supplement Native American perspective. Literature data was collected throughout the whole process of writing this thesis.

Data Collection from a Survey

My research took me to Nevada where I went to collect survey data. I only collected data from Clark County, the heaviest populated area. These surveys were collected outside of the Clark County Government Center in Las Vegas. I chose this area because it was referred to me as the best place to get in contact with locals. I stood outside of this building for approximately 3 days and I collected 110 survey responses.

I sent my Qualtrics link to two organizations who agreed to share my surveys: The Nevada Nuclear Waste Task Force and The Nevada Nuclear Waste Project Office. I also engaged a Nuclear Waste Advisor to help with email distribution as well. Each organization was asked to send out an email to ask the community to complete the survey (see appendix for more information).

My survey aimed to include people living on tribal and non-tribal lands. I also asked many questions that the above organizations and asked them to share the link with any other organizations they thought would benefit or had the right audience. These organizations are dealing with nuclear communication and they had wanted to see questions about how to best communicate to the public on my surveys. Questions included how to people get their sources of
information and about participants personal barriers to involvement (see appendix for more information). Many of my questions ask the participant to rate themselves and reflect upon themselves. The sixth question in particular asks to rate influence from a scale of 1 to 10, with 1 people the lowest and 10 people the highest. The survey included close ended multiple choice and open-ended questions.

**Analysis Methods**

All analysis of data was done using excel, and graphs were made using Excel. Excel is not necessarily a program used for statistical analysis, but the data I obtained was very simplistic. I will be using statistics for enhanced environmental justice work. When looking at literature and archives, I synthesized information and put my findings in the discussion section of this document. Both qualitative and well as quantitative data was gathered for analysis.

**Findings from Literature**

I got the chance to really analyze how Yucca Mountain got chosen to be the sole location to place the nations high-level radioactive waste. Yucca Mountain had been decided 2 years earlier, before the Nuclear Waste Policy Act of 1982 had been amended by the EPA in 1987. The decision was mostly made due to the high cost of studying multiple sites (Murphy, 2006). The site selection process began with 3 choices. A basalt choice in Hanford, Washington, a tuff choice at Yucca Mountain, and a salt choice in Deaf Smith County, Texas. These three choices
were taken from the western side of the United States with the expectation that another site would be chosen from the eastern side. This never happened (Cotton, 2006).

**The Decision-Making Process**

There are many actors who play a role who are not a part of the formal decision-making body. When talking about the specific subject of nuclear waste, the following people is said should be involved: the process owner, the implementer, the waste producers, the technical regulator, and the public (Krütli et al., 2010). Each role is called upon at a different time, though the government is overseeing the whole process. Sovereign nations are not mentioned.

When looking at the literature I saw that perception and history of a person or community was incredibly important when it came to how people accepted decisions going on in their community. While the Atoms for Peace speech was successful for the most part, nuclear energy was still being used for weapons development in Nevada (Greenberg, 2013). This history fueled a lot of the conversation of Yucca Mountain and anti-nuclear participation (Endres, 2009). From 1951 to 1992, 100 atmospheric and 828 underground nuclear tests were conducted and this was all on Native American land (Shafer & Hartwell, 2011; D. Quigley, 2000). The EPA set radiation protection standards for Yucca Mountain in 2001 without the consideration of the Native Community Action Council that represents the Shoshone and the Paiute (Zabarte, 2017). The Native Community Action Council was very present in the conversation about nuclear test sites on Native land.
Native American Perspective - The Governments Influence

There is a bad relationship both ways from the government to the people and from the people to the government; especially if talking about Native people. This has a lot to do with how people trust or distrust the science, government, and the people who make decisions (Perlaviciute & Steg, 2014; Livingstone and Lunt, 1994). The nuclear industry has made most of their decisions using the top-down approach and they have been associated with secrecy when it comes to talking with the public (Krütli et al, 2010). There is indifference, lack of respect, and disinformation when communities try to go through government agencies (Cole & Foster, 2000). There is low trust between native communities and the government (Shafer & Hartwell, 2011; Trousset et al. 2015). When Native American’s went to testify against the proposed plan, they were mistreated. When advocating for their risks, especially culturally and spiritually, Native Americans were not taken seriously. One of the things they were told was how there were not enough Indians alive in which to live the “real” lifestyle of a Native American that is spoken of and so these cultural losses should not matter (Arquette et al., 2002). The way that Native Americans and a lot of other people ended up dealing with decision-making is by taking to the streets with grassroots organizing.

Often, Native American reservations are compared to third world societies and they are often treated as such when it comes to decision-making processes (Adeola, 2012). This is shown by how Native governments are the last to get resources, infrastructure, and money for environmental issues (Arquette et al., 2002). The toxicity is often referred to as genocide (Brook, 1998). Some activists in the native community use the terms “radioactive colonialism” and “nuclear colonialism” when talking about Yucca Mountain (Enders, 2009).
The ways that literature discusses the different aspects of those who dump waste non-native people who dump on land are called midnight dumpers while Native American dumpers are called tribal entrepreneurs (Brook, 1998). While this is speaking of waste in general in a site different than the Yucca Mountain site, the reasons for accepting waste in these communities is the same drive, one of economic possibility. Native Americans and often other cultures are fighting things like this happen on a very different sense. There is then a location issue that states that places that host disposal sites do not get the economic benefit as communities that host the actual energy facilities (Gawande & Jenkins-Smith, 2001). Toxic and non-toxic by-products of industries are seen as unavoidable in the process of capitalism (Adeola, 2012). Toxic waste is then pushed into marginalized and impoverished communities with economic incentive without the permission of these communities.

Native Tribes in Nevada are more against Yucca Mountain because of the loss of land due to the Treaty of Ruby Valley in 1863 which states that this land was never ceded from the Western Shoshone to the government. The Western Shoshone have not touched the money given by the United States government, due to the belief that the land should not be owned (Houston, 2013). Even though the Western Shoshone tribe believes it has not ceded its rights because the money still sits in a fund, untouched, the United States government maintains that the transaction happened, and so the land is not in the management of the Western Shoshone (Ramirez, 1992). The land that is meant to be under management of the Western Shoshone is seen in the highlighted portion of figure 5.
The location of Yucca Mountain deeply affects traditional aspects of Native American people. The reason this is important is because placing nuclear waste at Yucca Mountain could
completely disrupt the culture of Native American practices (Harris and Harper, 1997). If Yucca Mountain were to become approved, places that are accessible to anyone will be limited. Yucca Mountain is a sacred and culturally significant area to Native American people (Enders, 2009; 2012). Native Americans also state that Yucca Mountain is a sacred space and that the meaning of it would change if nuclear waste were put there; Native people would not be able to decolonize this from happening (Houston, 2013).

Looking at the decision to place Yucca Mountain in Nevada brings up a wide variety of environmental justice issues. Deciding on Yucca Mountain as the sole location to research as where to place the United States nuclear waste was a decision of inequity (Cotton, 2006). In terms of how this affects Native Americans specifically, “66% of the known Uranium deposits are on reservation lands, as much as 80% are on treaty guaranteed land and up to 90% of Uranium mining and milling occurs on or adjacent to Native American land” (Enders, 2009). In 1989 and 1990, Shoshone and Paiute participated in the creation of the Radiation Exposure Compensation Act of 1990 that allowed compensation for those who got cancer from the uranium (Zabarte, 2017).

Most of the Native Americans who feel much of negative impacts of these decisions are those who still participate in traditional practices of their people. Due to their cultural practices of hunting and gathering, they are often more exposed to the toxicities of the nuclear waste (Abel et al., 2005). For Native American communities, there both cultural risks and physical health risks associated with nuclear waste. There is more of a likelihood for sickness and health consequences due to nuclear waste than that of the general public. There is data that states that community members on Native land saw a health decrease when Native practices were avoided
due to fear of toxicity. This was because when these communities began avoiding hunting or the gathering of herbs for medicine, they ended up increasing their sugar intake due to economic struggles to buy good food (Arquette et al., 2002). This is both is the sense of losing land that should be protected by treaty than by actual risks. While some of the practices can be done in a suburban context, like gardening for example, some cultural practices are intrinsic on the land (Harris & Harper, 1997).

Native American’s are sovereign governments, but this does not mean they have protection from exploitation (Endres, 2009). Native American’s are often seen as inadequate in helping to make decisions like the Yucca Mountain decision and this is why treaty rights get overlooked (Arquette et al., 2002). We see time and time again where the voices of tribal nations have been ignored. One of the many examples is with water rights when the Winters Doctrine was passed in 1806, yet more people living on reservation land do not have access to water (Library of Congress). History of environmental injustices leads to distrust in the government. Disasters affect different levels of society differently (Adeola, 2012).

**The Role of Media and Policy**

Media plays a huge role on how the public feels about an issue. Some studies have shown that risk managers and communicators are seen by the public as being more trustworthy if they share similar core values (Siegrist and Cvetovitch 2000 qtd in Shafer, 2011). When it comes to policy, when the presidents are inconsistent with their messaging, people tend to have a harder time finding something to believe or put this way: Inconsistencies in what the presidents creates inconsistencies in what the public is to believe (Greenberg, 2013). Media reports leave readers
with little clarity. In places that tend to have a better plan, people to be more on board with what’s going on. In places that have no plan, people tend to feel the way media makes them feel about the issue (Greenberg, 2013).

Media leads to bureaucratization and inequalities in the political sphere (Livingstone and Lunt, 1994). Media attention is not always good and sometimes can hurt an effort put on by a community person, especially if from a marginalized group. When it comes to creating history, marginalized communities step up with protests and marches anyway that get media attention because they are often not welcome at hearings or other formal governmental discussions like that. Their preferences and risk beliefs are driven by feelings, emotions, experiences, and present knowledge (Greenberg, 2014).

When the Nuclear Waste Policy Act was passed in 1987, it was often referred to as the “Screw Nevada bill” (Houston, 2013). National Sacrifice Zones coined by the US government during the Cold War about the radioactive hazards is what people fear will become of Nevada (Adeola, 2012). The phrasing of legislation and what the media then portrays can really dictate how the community is going to respond to such a bill. In Nevada in which the economy is deeply intrinsic on the tourism, this can deeply affect acceptance of a nuclear waste storage facility.

Tragic environmental events like Fukushima, oil spills, and other events like these also influence how people support or do not support policy (Greenberg, 2014). A disaster can be lost in time and space (Adeola, 2012). This means that even though something is an ongoing problem, the media is already on to the next event quickly leaving issues lost in time. The United States has framed the nuclear conversation through the lens of energy security and nuclear safety.
People consider the risks of nuclear power as “unknown” and people fear the unknown (Perlaviciute & Steg, 2014).

The Role of Science

It is often the case that people fear that science is being put forward in the benefit of the polluter (Arquette et al., 2002). When the Department of Energy gathers public opinion, for example, the stage in which this happens is usually only when trying to calculate an Environmental Impact Statement (EIS) or an environmental assessment of a given location (Greenberg, 2015). There was a study that looked at the EIS in the specific case of Yucca Mountain, and this study found that public opinion did not influence the EIS at all (Ratliff, 1997). Even though lab tests were done to test for health impacts from nuclear testing activities, researchers assumed perfect health from the start or they only tested exposure on animals which may not be completely applicable to human exposure. Events like this happening leads to distrust in the science that affects communities (Arquette et al., 2002). Just as simple as using the word science draws attention away from people thinking that action needs to happen (Arquette et al., 2002).

When it comes to participating in the conversation, discourse is often deterring to try to gain the technical information of the proposals because of the terminology used by the system (Cole and Foster, 2000). This leads to a public that may not understand information presented in science and a media that can warp its perception (Merchants of Doubt).

Science can be trusted and this is usually through the use of community-based participatory action research (CBPAR). An example of this is the Nuclear Risk Management for
Native Communities Project that focuses on research, education, and community action (D. Quigly, 2000). CBPAR connects community members with academic research to create social change by generating new knowledge. Most other forms of research find community participation as a contaminant to the results found. Intentions do not matter and research goes on without the voice of the community. In the campaign for environmental justice, as a result, community members are disempowered. CBPAR strives to level the playing field between community and researcher; a level that creates democracy and equality. Community members help with creating a research agenda and project design. CBPAR creates an effort to engage community members in conducting the research. Community leaders are the “bridge of trust” between the community and the researchers. CBPAR relationships must be rooted in trust and therefore require constant communication. The final product must inform action for positive change (Bacon, 2013).

In a Duckwater Nevada Case study, there were increased levels of Iodine from nuclear weapons testing that came from the consumption of wild rabbits (Abel et al., 2005). The Duckwater Nevada study used participatory research to focus on a thyroid cancer awareness campaign (Abel et al., 2005). Participatory involvement never looks the same and that can be a factor in decision-making processes.

Results from Survey

The purpose of this section is to provide answers for the second research question. It is important to note that in the discussion section, I compare findings from this survey data to
findings in literature due to the lack of Native American voices I was unable to get. There was only one person, out of the 110 that I surveyed, who stated themselves as being a Native American. Other than that the average age of those who I surveyed was 47 years old.

Of the 110 people I surveyed 11.8% said yes they wanted the depository at Yucca Mountain, 5.4% of people stated that it was necessary that we have the waste site placed at Yucca Mountain, 81% of people said no they did not think it was a good idea to have the nuclear waste site at Yucca Mountain, and 1.8% of people did not answer the question at all. This was the second question I asked, after knowing whether people value Yucca Mountain or not.

I got more variation of respondents than I thought I was going to get, but there was no real statistical significance between the populations.
Following the question above, I asked a follow-up question on why they chose what they did. Health was the largest reason for choosing why people did what they did. Right after is safety and environmental reasons. This is then proven through some of the things that people said when it came to whether they wanted Yucca Mountain to become a place for Nuclear Waste storage or not. Some people stated things like, “So my children don’t glow in the dark”.

Health was a very important indicator of whether people opposed Yucca Mountain or not. People are more close-minded to having the nuclear waste repository site located at Yucca Mountain because of having family or knowing someone who worked at the site facilities. Of the people who expanded on the issue in my study, one person wrote, “I don't want to die from toxic waste or cancer from Yucca Mountain.” Due to the history of health issues that came from the Nuclear Test Zones, it is no wonder that people are most worried about their health. I had talked to one woman in particular who had told me that her father ended up getting lung cancer from working at the test site and died in 2003. She described her father as a “very sick man.”
probability of getting sick is known to be varied by many factors like age, health, genetics and more (Arquette et al, 2002). Even sickness is differently represented on Native American land than it is among people who do not live on Native American land.

Native Americans, are often advocating their ability to stay alive and keep their cultures alive. When comparing the data found on my surveys and the data found in literature, only 18.18% of people chose cultural significance on why they agreed or disagreed with nuclear waste. When it came to the few people that stated that cultural reasons where why they chose their answer one person wrote, “cultural -example in the highest degree of irresponsibility”.

![Reasons why people are for or against Yucca](image)

This following question about where people get their information was one of the questions asked because when talking with the organizations that were dealing with nuclear waste, they wanted to know this information to best to communicate with the public and share
information with them. You can see from the graph that News is where the most people get their information from about issues going on in their community. The problem with news as people’s main media source is that issues are only talked about as hot topics. Once things are talked about they then are thrown under a rug as the next things get talked about. When looking at my data, we found that social media and news was one of the ways in which people got their information.

The next top place people get information from is social media. This may have been shifted to the top had the sample had more representation from younger age groups. Social media has been profound in being able to reach a lot of people, especially the younger generation.

I asked participants to rate themselves on a scale of 1 to 10 on how influential they think they are when it comes to talking about where to place the nation’s nuclear waste, 1 being not influential at all and 10 being most influential. When I got my data, I did get many 0’s and I kept them because I thought the act of using a zero was significant. The average for this question was
a 3.09. This belief in their own power is low when it comes to making an impact with things going on in their community. This may have changed had I been able to ask this question on a Native American reservation, and due to internalized oppression, the number may have been even lower (Adeola, 2012; David, 2013). The number may have also been higher due to the empowerment that comes from participating in grassroots efforts (Krütli et al., 2010). I cannot interpret which is true without the ability to get into these communities.

![Involvement of Participants](image)

In terms of the graph above, how powerful people feel may have influenced whether or not people got involved with this project. This may give perfect example as to why there are so many people (54.54%) said that they have not been involved at all. Of the rest of the involvement you see 14.54% of them checked more than one box to show their involvement and at least two people did not check anything. This means that of the people involved, we can see that they are involved pretty heavily while the mass proportion of people are not at all. When one person expanded in the “other” section of barriers to involvement (see below) and stated, “I
doubt if anyone is interested in my opinion.” Many people said that the government is just going to do what they are going to do. One person stated, “the nations toxic waste has been an issue since the 1970s and it seems the government does not want advice on the issue.”

The two biggest reasons why people are not very involved to the above question is because of distrust in the government and lack of time. Of the 11 people who said that there are no barriers, only 2 of them were involved in the issue. This means that out of the people that are involved, 1.83% of them found that there was nothing getting in their way to getting involved. Had more people been able to be surveyed, statistical significance could have been found on this premise of the data.

I found this by: 100% participants-54.54% not involved = 45.46% involved in some way. 50 people of the 110 were involved, I subtracted 2 people to get how many were involved but did find there were barriers to involvement. 48/110= 43.63%

45.46%-43.63%=1.83%
What is exciting is how many people said that they would get involved if the barriers that were in the way of involvement were taken away. The problem with this, however, is while 58.18% said yes, and 21.18% said unsure, this question is very hypothetical to organizations dealing with the issues of involvement because there is no way that they can control all the different variables acting as barriers. For future analysis, and what I will try to do some here, is offer some ways in which access to involvement can be alleviated. Many of the reasons why people do not have time to participate is due to a structural issue. Ways to increase trust in the government, however, can be found in the recommendations section of this thesis.
One of the last questions before I asked a few questions about demographics, was if the new administration, the Trump administration will listen to people's input. There is some question as to whether this question was understood completely. Some people asked me for verification on whether the questions was about the Trump administration or their local administration. Once I received that clarification question, I made sure to tell all the people talking the survey afterwards about what was meant by that question. Because this confusion was asked about 5 people in, and I then mentioned it to all the following participants moving forward, I do believe the data is still usable. Only 15.45% were sure that yes, the Trump administration will listen to their input.

Discussion

Nuclear power from cradle to grave has issues throughout the whole process of its lifespan. Many other energy sources also have issues, as well do most things in life. The intent of
this first research question was not to gain perspective on whether nuclear power was good or bad as an energy source but to objectively state the problems of nuclear power so that the reader of this document can form their own opinion about the resource. It was not put into context of other resources. And it was to provide a direct foundation for answering the remaining two questions.

Scientific consensus states that geologic disposal is the best mechanism we have in dealing with high-level radioactive nuclear waste. Regardless on whether or not people believe that nuclear power is good for the planet because of its low carbon emissions, the waste causes issue and it must go somewhere. One of the biggest problems that scientist and the public fear is uncertainty. Transportation was another big issue, and when taking into account the decision-making process, this then includes the voices of the public who the waste is passing during transport as well. On the other hand, if there is not a nuclear repository found soon, there is also the issue of all the power plants having to store this waste in facilities not created for this purpose. This creates a different problem because though transportation is an issue, there are other issues in leaving the wastes near the power plant facilities. This then agrees with my findings about health, safety, and the environment as main issues why someone agrees or disagrees with Yucca Mountain, depending on how you value impact. It seems that even science is in uncertainty because some people’s perception of safety and impact statements can be broadly different to another’s depending on perspective.

Perspective can be created in many different ways. For the second research question, I focused primarily on a Native American perspective and its relationship with the government. While this study could have been about any demographic group, I believe that every culture
would have a different story of involvement and environmental or cultural impact that then leads to a different viewing of nuclear waste. The relationship between the government and Native American’s is driven with environmental justice issues and distrust. The Native tribes have problem accessing the government and the government also has trouble accessing native tribes. A lot of this is due to the mistrust that Native Americans feel towards the government. At the same time, the government does historically do a good job honoring sovereign nations as powerful entities with decision-making power. Whether related or not I found it curious that even as I was performing my own research, I was unable to get in contact with Native Americans as well. This can be explained in both with an economic lens and one of land rights.

Economics plays a huge role in acceptability of environmental issues. People want jobs and prosperity, and when you live in poverty you will accept any type of risk. We saw this pressure being true for Native Communities as well as other marginalized ones. Nevada was seen as a sacrifice zone, a wasteland, so there in laid some of the reason for people to feel one way or another about this issue. On the governments side, for example, in 2004, the DOE stated that there are no natural resources of commercial value at Yucca Mountain (Endres, 2009). However, Native Americans still continue to stand up even if it means their economic status stays the same. This is due to environmental justice issues not being looked at, which leads to a decision like Yucca Mountain taking over 30 years to make. Economics is seen on both sides of the spectrum. Who then has to make the sacrifices is where controversy is created, and this unequality creates more distrust between those who feel this burden most often.

Native American’s and Yucca Mountain also have controversy over land rights. Due to the treaty of Ruby Valley and the fact that this land is originally the land of the Shoshone, there
is major controversy over placing nuclear waste here. If the United States places the nation’s nuclear waste at Yucca Mountain it can be seen as what activists call radioactive colonization and the squandering of native culture (Enders, 2009; Huston, 2013; Malin, 2015). Native American’s history of colonization and the continued ignoring of treaty rights by the government continues a wave of distrust between the two entities. I mention the water rights in the winters doctrine which happened in 1806 in the findings section because I found it interesting that these humans are still advocating for rights over resources and land today. It is this abandonment of equity that leads to one of the main reasons Native Americans, and other marginalized communities, get involved.

There are many barriers to involvement, which we found this both in my survey and in literature. It is this involvement that can cause many community members to feel disempowered. This form of oppression allows the continuation of placing nuclear waste close to marginalized groups of people. Oppression of a peoples creates psychological and physical effects on marginalized communities in different ways, and I mostly give light on how this could be viewed by the Native American population. There is a victimization that comes with years and years of something happening to you: you begin to feel like you deserve it or there is no way for better treatment (Adeoa, 2012). It all begins with calling this part of the land a wasteland. When Native American’s are seen as throw-away people, it allows the land to be seen as throw-away land in a throw-away world for the purpose of economic sanction and progress. If we empower the land we empower the people and vis-versa.

When looking at an environmental justice perspective you end up asking yourself why those who are gaining the benefit of nuclear waste are not also those who bear the burden of the
costs. Choices for the repository were chosen only on the western side of the United States to be studied first even though the nuclear energy is used on mostly the eastern side of the country. Even if Nevada was seen as a wasteland in the minds of American’s because of the history the nuclear test sites that had gone on there, the decision to make Yucca Mountain a national repository a just decision. Moreover, it may be percieved that the Atoms for Peace speech was a tactic used by the government to continue nuclear testing in Nevada and have the public be distracted by an uncertain but cheap energy source. The environmentally friendliness of this sentiment may have also been stretched due to the long-lasting radioactivity of the nuclear waste. I also found it very nerve-racking that the Nuclear Waste Policy Act had been amended after the passing of what seemed like a more equitable plan to a less equitable one. The EIS was also only gathered after the decision for Yucca Mountain was made, Nevadans were at a disproportionate side of the battle when it came to share their opposition of the project and according to my data, opposition was felt according to 81% of the people who filled out my survey. While I can lean towards this viewpoint drawing conclusions from literature data, I cannot draw causation from this correlation without further research.

For the second research question I also look at the role of media, environmental justice, and science. This uncertainty in the science, along with environmental justice issues, impacts the media and how the public is influenced on the conversation on where to store the nation’s high-level radioactive nuclear waste. This is especially true for the people who live in Nevada with the inclusion of Native American’s and other underrepresented voices. The activeness and interpretation of the public is both influenced by science and the media. The media, however, can often make things more confusing. For example, Native American’s who act with an
environmental justice lens are largely doing so because of personal experience and a protection of culture. This action is not directly linked to science. Those who helped bring this issue to a standstill are active in their community, but literature does not have the whole picture on what the average person wants and how much they know about nuclear waste issues. Media jumping from issue to issue is detrimental to environmental justice and when creating equitable policy because it allows for those who may have been asking for change to go under the radar. What it takes for the Native community to be picked up by the media or noticed by the government is by drawing a lot of attention towards them. But because of the barriers to being a part of the formal governmental process, this is often the only option left for people to do. There is then a lack of information present on how the science is informing communities about Yucca Mountain and issues like Yucca Mountain. This means people could be acting and they too could be missing a perspective, just as the government may be missing theirs. And while this does not mean that the public is ignorant, on the contrary, they are just not being exposed to all the details.

This then leads to the answering of my last research question that was found mostly through the use of a survey but it also supplemented through the findings of literature. This question was analyzing how influential the public feels and whether we can bridge the gap between the science, the government and the people. When looking into participation, most people do not feel that their voices have influence. This can be linked to their distrust in the government and other barriers like time. Though I focus on a Native American perspective, this distrust is widely seen across the general public as well. A way to fix this is by focusing on the main barriers that people see to getting involved and combating each one with participatory research. In my findings from literature I found that community research that is catered to
different communities in different ways is the best mechanism for creating trust but also in empowering the public. Participatory research has to be inclusive otherwise it defeats the purpose. Another appropriate mechanism to combat this is outreach to communities at risk. This can be done in many ways and social networks seem to be a very good way to have it be done (Wallman, 2015). You can also see this is true in my data, where social media is the second highest way people get their information. Sometimes it is hard to know what to believe on social media also, and this is where the government and science can help with this aspect of informing their people.

Scientists, environmental activists, lay persons, and the media are key actors in the decision-making process (Adeola, 2012). This is where we can bring more indigenous voices into each section. Leadership should be coming out of Native communities, and other marginalized communities as well, and this is incredibly important. This leadership should include, but is not limited to: decision-making, policy planning, resource management, and conservation activities (Arquette et al., 2002; Ohlson et al., 2008). The people want and should be able to obtain these roles in their communities. Literature states that Native American people demand meaningful role in risk assessments, remediation’s, and restoration decisions (Arquette et al., 2002). A solution to this is by talking about possible solutions on a more community-based level. This can be done using the bottom up approach (Arquette et al., 2002). Participatory science is a bottom-up approach to educating and empowering the public.

When we talk about public in these research questions, we need to be thinking about all voices. By being inclusive we can then value things like the Native American perspective which is culture. They value balance, caring and respect for the land. Native American’s think humans
are no lesser or greater than the plants and animals that share the space (Ramirez, 1992; Brook, 1998; Houston, 2013). Western thought is quite the opposite where humans are valued above all other forms of life and we that have control over nature (Adeola, 2012). Why we should value native perspectives and other marginalized voices is because they have lived what the media and politics doesn’t cover. This is where the culture comes in. Culture is that viewing of nature and the land and the people in a different perspective. When we empower these people, it then becomes harder to be able to talk about the uncertainty of waste because there are different voices coming to the table. This can influence our footprint on the world and the people in dramatic ways. You would just get the story of what the general public fears, when the whole environmental justice issue should be looked at. Having more voices and inclusivity increases better conversations and a better decision being made.

**Limitations and Questions for Future Study**

Originally, the plan was to go down for two weeks and to go to two different Counties: Clark and Nye County. A Qualtrics link was sent out through organizations in two other counties where I wanted to gather data: Washoe and Eureka Counties. I chose Clark and Nye counties due to their proximity to the Yucca Mountain site; I chose Eureka and Washoe Counties due to their online presence related to nuclear waste management. Due to time and lack of funds, my original plans changed.

A very large challenge that I was not able to overcome in my data collection was representation of Native American tribes. I reached out to the tribes closest to the site, plus my
own tribe. I did not hear back from any of them except my own tribe. The only way I could even get my tribe to answer their phone was when I called through my grandma’s number. I think this could have been due to my out-of-state area code. My tribe agreed to help me after questioning me a lot (rightly so) but they wanted me to personally stand in front of the tribal council and present my research proposition, in which I had not the time to do. Later they said that I had to just send them the link to my information. I did this but they could not get approval until after my data collection time was over. Later during my research, I found that the population of Native American’s in Nevada is a very low population indeed. When looking at the consensus, the Native American population was only 1.19% of the whole amount of Nevada territory. While I should have considered this sooner, I was blindsided by my own experience of only ever being on reservations.

I put up posters that allowed people to get the link to fill out the survey. I put these mainly in libraries. When I left Nevada, I took them down because they had my personal email on them and the timeframe in which I needed them up was winding down. The time frame of the thesis project was incredibly minimal, so these posters were not up long enough to get the full amount of value of them. This project was rushed from start to finish.

There was an issue in my Qualtrics link that I did not notice until it was too late. Even though I had many organizations willing to send out my link, I only got 1, unfinished, response and it went unfinished because there was a problem with Qualtrics. While I had checked the link and taken the quiz myself, I do not know why this did not work. By the time I got approval from the IRB and sent the emails, there was only a few days before the surveys had to be completed. Timing, again, was an issue.
One way in which I faltered when it came to the questions I asked was because I did not ask enough about demographics. While only those who were older than 18 could be recruited, the average age of those who took my surveys was 47. This influenced my data because it would have been interesting to see the difference between younger and older participants. I only had about 3 people in my data who were in their 20’s, and this was not enough people to find statistical significance. I also did not realize the importance of asking about things like gender until it came to the time when I could have compared that to how people responded on their surveys. If I could do it over again, I would put more demographic questions into my surveys for analysis and disperse my location for gathering more random survey data.

Doing this research only left me more curious. Can sovereign nations be considered as legitimate as the government? What would happen to the state of our resources if this were to happen? Is the dishonoring of treaty rights equivalent to dishonoring constitutional rights? In terms of nuclear power in general, how green is all the transportation routes necessary? What role does education play in all of this.

Conclusion & Recommendations

While I focus on nuclear power and the high-level nuclear waste as a result of this privilege, I believe that creating better communication between science, the public, the government, and the media can influence other resource decisions as well. This could be looked at for further study. The perspective and actions of the public are deeply influenced by the media and environmental justice. The decision-making practice for Yucca Mountain today, is one that
seems to follow a very problematic structure. It is the disconnect between all these different components of our society that leads to the decision going on for more than 30 years.

The media, the government, and the public should be influenced by science that is created with participatory mechanisms if able to be done. It would be interesting to see a world where organizations carried a mark that states whether they are influenced by inclusive research or not. It’s sort of like an organic stamp, only traceable by law makers and the public as free and accessible information. Inclusivity in the governmental and scientific community needs to be expanded upon. Universities are in amazing positions to be allies. They can bridge the gap so that transparency is happening at every stage of the process. If this was how decisions were made, instead of with distrust among the public and a legacy of environmental injustice, decisions would probably be decided upon sooner that is better for the environment and the people (or at least more equitable). Because the truth is, nobody seems to want waste in their community. So that then goes to the source of the problem, why is this energy creating such a dangerous waste? This can only be looked at through further research, but I know that inclusivity of voices will only being the world closer to healthier or more equitable solutions.

In the end, you are not going to satisfy all different types of people, it is known that people tend to trust decision-makers who agree with their core values more (Schafer & Hartwell, 2011). But, we can look at who we have disproportionality burdened and try to make that more equitable and accessible to get involved. If we did this, not only would the public become more informed, but the old woes could try to be restored between communities and the government. If we place value on Native American ideals and keep Native American people in leadership roles on this issue, I believe that decisions could be made that are not only better for the environment,
but also for the people. It could be placed in the areas in which benefit from the resource. It is either this or the continued destruction of Native American culture and destruction of our environment.
Bibliography


Appendix

Consent Form and Survey Questions

CONSENT FORM

Purpose of the Study
The purpose of the study is to better understand community participation in the conversation about Yucca Mountain being considered as a storage site for the nation’s nuclear waste. The results of this study will be shared with organizations so that they may better inform the public about how to get involved and to improve access to information around this topic.

We invite you to take part in this research study because you are a resident of Nevada living in one of the following areas: Clark County, Nye County, Eureka County, White Pine County or Washoe County. You are also an individual over the age of 18.

This survey will take 5 to 10 minutes to complete. We expect about 400 people will be in this research study.

Explanation of Procedures
Before completing this survey you must sign this consent form to participate. All surveys will be anonymous and consent forms will not be linked to survey results. Upon ending the survey you have the chance to opt in to the anonymous results of the survey. Analysis of this data will happen as soon as all survey results are in. If you are chosen as a winner of the one of the two gift-card giveaways, you will be reached out to and the gift card will be mailed out. After prizes are delivered, all identifying information will be destroyed as it is not necessary for the purpose of this research. If you chose to opt in to knowing the anonymous research results, you may have the option to do so. Results will not come to you until the latest May. All identifying information will be destroyed after this information is released.

Voluntary Participation and Withdrawal
Whether or not you take part in this research is your choice. You can leave the research at any time and it will not be held against you.

Potential Benefits
We cannot promise any benefits to you or others from your taking part in this research. However, possible benefits include access to information that may improve organizations ability to talk with the general public about the Yucca Mountain decision.

Confidentiality
Information obtained about you for this study will be kept confidential to the extent allowed by law. Research information that identifies you may be shared with the University of Colorado Boulder Institutional Review Board (IRB) and others who are responsible for ensuring compliance with laws and regulations related to research, including people on behalf of the
Office for Human Research Protections. The information from this research may be published for scientific purposes; however, your identity will not be given out.

Payment for Participation
You will not be paid to be in this study.

Questions
If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team at elle8786@Colorado.edu

This research has been reviewed and approved by an Institutional Review Board (IRB). You may talk to them at (303) 735-3702 or irbadmin@colorado.edu if:
Your questions, concerns, or complaints are not being answered by the research team.
You cannot reach the research team.
You want to talk to someone besides the research team.
You have questions about your rights as a research subject.
You want to get information or provide input about this research.

Signatures
Your signature documents your permission to take part in this research.

Signature of subject ___________________________ Date ______________

Printed name of subject ___________________________________________

Signature of person obtaining consent ___________________________ Date ______________

Printed name of person obtaining consent ______________________________________

Survey Questions:
What does Yucca Mountain mean to you? (select all that apply)
_it means nothing to me
_it is a place of cultural significance
_it is a place that is of importance to me
_other

______________________________________________________________________________
______________________________________________________________________________

Do you think it is a good idea for Yucca Mountain to become a space to store the nation's nuclear waste? (select all that apply)
Please select why you chose what you did (select all that apply)

_ cultural reasons _ environmental reasons _ job security reasons _ justice reasons
_ economic reasons _ health reasons _ safety reasons _ other __________________________

How do you find out about decisions going on in your community? Please rank from most 1 being most important to 10 being least important

_ community organization(s) _ friends _ I am personally affected/loved ones are personally affected _ listening to the radio _ participating in protests AND/OR Public displays of opinion _ people going door to door _ reading the news _ social media _ word of mouth _ Other(s) __________________________

How have you been involved in the decision making process for deciding where to put nuclear waste? (Select all that apply)

_ None _ Answering governmental survey/ people coming to your door _ Going to public forum or awareness raising event/voting on this issue _ Writing a letter/ speaking publically /giving feedback/ posting on social media about it _ Working with other people to oppose or support (organizational meetings/group letters) / attending protests _ Taking a leadership role: working to organize other people/employing people to work on this/presenting to people about this

On a scale of 1-10 how influential do you think you are in the conversation about where to place our nuclear waste? 10 being the most influential

________

What are some barriers to getting involved with the issues going on in your community? (select all that apply)

_ distrust in environmentalists _ distrust in the government _ inaccessible information _ lack of resources
Taking into account the above barriers, would you be more willing to be involved if they were not there?

_ yes
_ no
_ unsure

Do you feel the new administration will listen to your input?

_ yes
_ no
_ unsure

Is there anything about this issue that you want to elaborate on (ex. ways to improve involvement in decision making processes, how you feel about this issue, etc):

______________________________________________________________________
______________________________________________________________________

How old are you?

________

What is your race/ethnicity? (select all that apply)

_ African American
_ Asian American
_ Latino/a
_ Native American
_ White/Caucasian
_ other
_ prefer not to answer

Are you a part of a tribe? If so, which one?

_ yes: Which one: ________________________ - 
_ no
_ prefer not to answer

What county are you from?

__________________

How long have you lived here?

__________________
If you are interested in being a part of the raffle please state a way of contacting you here. Note that for privacy purposes, once eligibility is established your information will be unlinked from your survey responses. Eligibility is only determined through the completion of the full survey. Once the winners are announced all contact information will be destroyed unless you want to see the anonymous results of this study and then contact information will be destroyed after a report is made.

_I want to find out about the results of this survey_  
_I have completed this survey in its entirety and want to be entered into the running for one of the two $25 gift cards_

Email: ____________________________________________  
Phone: ____________________________________________  
Address (if no access to email or phone): ____________________________________________

**Information on Posters:**

When sharing this link, the organizations will only use the below message so there is not potential for accidental coercion or undue-influence.

- **Hook:** Calling all teachers, community members, activists, parents, and workers:
- **How involved are you in the conversation about where to place our nation’s nuclear waste?**
- **Participate in a 5-minute survey about Yucca Mountain and be entered into a raffle to win one of two $25 visa gift cards!**
- **Mission Statement of the study: The purpose of this study will focus on community participation and the consideration of Yucca Mountain as a place for our nation’s nuclear waste.**
- **The duration in which the survey is open and an email to contact the PI (all posters will be removed upon leaving Nevada).**
- **CU Boulder’s logo and address**
- **This study is put on by a university student interested in community participation and the proposed nuclear waste site at Yucca Mountain**
- **The link to the survey**
- **A picture of Yucca Mountain**
- **The statement: **You must be 18 years or older to participate**

**Email sent out for Recruitment Purposes:**

Dear Teachers, Community Members, Activists, Parents, and Workers of Nevada,
My name is Elizabeth and I am a 4th year student at the University of Colorado Boulder. I am conducting research around community participation and the proposed nuclear waste site at Yucca Mountain. I am administering a 5-minute survey that has the goal to understand participation and barriers to participation on this topic.

These results will be shared with organizations focusing on nuclear waste so that they may better understand their constituents and how they feel about nuclear waste being stored at Yucca Mountain.

I am looking for 400 participants from the following counties: Clark County, Eureka County, Nye County, and Washoe County.

When you complete the whole survey, you will be entered to win one of two $25 visa gift cards. The two winners will be contacted on January 27th by the latest.

This survey will be open until January 15th. Here is the link to participate: (do not have link yet).

If you have any questions or concerns please contact me at YuccaProject@Colorado.edu

Thank you for your time,
Elizabeth