

## **The Pahrump Valley Museum Yucca Mountain History Exhibit - 12389**

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### **ABSTRACT**

As part of its management of the Yucca Mountain project, the Department of Energy maintained several information centers to provide public access to information about the status of the Yucca Mountain project. Those information centers contained numerous displays, historical information, and served as the location for the Department's outreach activities. As the Department of Energy dealt with reduced budgets in 2009 following the Obama Administration's intent to terminate the program, it shut down its information centers. Nye County considered it important to maintain a public information center where people would be able to find information about what was happening with the Yucca Mountain project. Initially the Nye County assumed responsibility for the information center in Pahrump; eventually the County made a decision to move that information center into an expansion of the existing Pahrump Valley Museum. Nye County undertook an effort to update the information about the Yucca Mountain project and modernize the displays. A parallel effort to create a source of historical information where people could find out about the Yucca Mountain project was undertaken. To accompany the Yucca Mountain exhibits in the Pahrump Valley Museum, Nye County also sponsored a series of interviews to document, through oral histories, as much information about the Yucca Mountain project as could be found in these interviews. The paper presents an overview of the Yucca Mountain exhibits in the Pahrump Valley Museum, and the accompanying oral histories.

### **INTRODUCTION**

Partly due to the efforts of the Ford family, the Pahrump Valley Museum was developed to document the history of the Pahrump Valley. The town of Pahrump is located in Nye County, Nevada, approximately 60 miles west of Las Vegas. The Pahrump Valley has a long history of mining and agriculture, particularly large farms growing cotton. The growth of the town of Pahrump is partly attributable to its climate, and its rural setting is attractive to many retirees.

Nye County is also the location of the Nevada National Security Site (formerly known as the Nevada Test Site), and Yucca Mountain, the site Congress directed the Department of Energy to study as the sole location for development of a repository for high-level nuclear waste and spent nuclear fuel. Located on the west side of the Nevada National Security Site, Yucca Mountain was studied from 1978 until 2009 to determine its suitability for a repository for high-level nuclear waste and spent nuclear fuel. The site was selected by Congress in 1987 as the only site to be studied for a repository.

In 2002, Secretary of Energy Abraham completed his evaluations and informed President Bush that he believed that the site was suitable for a repository. The President sent the

recommendation to Congress, and, as allowed by law in the Nuclear Waste Policy Act, the State of Nevada submitted a notice of disapproval. Congress overrode the State's notice of disapproval on July 23, 2002, approving the site at Yucca Mountain, Nevada, for the development of a repository for the disposal of high-level radioactive waste and spent nuclear fuel, pursuant to the Nuclear Waste Policy Act of 1982. The Department of Energy submitted an application for a Construction Authorization License Application to the Nuclear Regulatory Commission on June 8, 2008.

In 2009 President Obama decided not to go forward with the repository program at Yucca Mountain, preferring instead to look at alternatives, including storage and advanced reprocessing technologies. On February 1, 2010, the President's budget directed the Department of Energy to close the Yucca Mountain program. In doing so, the Department of Energy attempted to withdraw the License Application with prejudice, a specific effort to preclude it from ever being resubmitted.

While working on the Yucca Mountain project, the Department of Energy maintained and staffed three Information Centers, located in Beatty, Nevada, Pahrump, Nevada, and Las Vegas, Nevada. The Information Centers were staffed by Department and contractor personnel, and in addition to providing access to Yucca Mountain project documents and reference material, provided support to coordinate tours of Yucca Mountain, host speakers' bureau presentations, and provide materials and facilities for project meetings. As the budgets for the Yucca Mountain project decreased, the Department of Energy first closed the Beatty Information Center, and ultimately closed both the Las Vegas and Pahrump Information Centers. In an attempt to keep a source of current information readily available to the citizens of Nye County, the County assumed the lease for the space occupied by the Pahrump Information Center, and initiated efforts to keep the facility from closing. In closing the Information Centers, the Department of Energy removed all computers and video software; many exhibits of significance and much important reference material were lost. Nye County was eventually able to acquire the computers and restore or replace the video software, and it reopened and staffed the Information Center with Nuclear Waste Repository Project Office personnel. Subsequently, the Information Center was closed and reopened in a different format and venue.

The Nye County Board of County Commissioners, with strong personal support from Commission Chair Gary Hollis and Commissioner Joni Eastley, led an effort to obtain expansion space in the Pahrump Valley Museum (Figure 1) and develop a Yucca Mountain exhibit that retained the themes of the Pahrump Yucca Mountain Information Center, and greatly expanded the exhibits to provide a more extensive, self-guided overview of the Yucca Mountain project. A principal goal in developing the museum exhibits was to preserve elements of the history of the Yucca Mountain project in an arrangement that was conducive to educational outreach and present it in a state-of-the-art digital interactive format. The new and revised exhibits encompass a number of aspects of the Yucca Mountain project.



Figure 1. Pahrump Valley Museum.

## **EXHIBIT DISPLAY TECHNOLOGY**

From the outset, the Yucca Mountain exhibit was designed to be more than simple displays geared toward a casual observer. A principal goal for the individual exhibits was to provide enough information that an interested user would be able to reconstruct elements of the history, purposes, and elements of the Yucca Mountain project. This resulted in a need to provide user friendly access to the vast amount of information available within these exhibits. The developers sought to implement state-of-the-art technology in the displays. The displays needed to be sufficiently self-explanatory because there would not always be experts on hand to answer questions. It was seen as vital to provide displays that allowed visitors to easily access the specific information they were interested in.

Each exhibit is essentially a standalone kiosk requiring virtually no maintenance by museum staff. The equipment self manages and has the capabilities of shutting itself down at the end of the day and starting itself up at the beginning of the day. The exhibit kiosks have been designed to be completely tamper proof and shielded from any unwanted user intervention with either the hardware or the software. The exhibit kiosks simply operate within a shell ignoring anything other than the intended use. The setup is ideal for the public, especially under non-staffed operation and remotely monitored environments.

A mixed media environment was selected to provide fluid and seamless access. Each exhibit is hosted on a twenty four inch touch screen display and presented in an interactive Flash<sup>®</sup> platform. By simply touching the screens, visitors can initiate a self-guided tour throughout the exhibits. This method easily allows people to access hours of engaging information about the Yucca Mountain Project.

The exhibits display photos, videos, and voice narration in an appropriately interactive experience. For example, certain of the exhibit kiosks have numerous screens to access; the interested visitors can proceed through them at a pace suitable to their level of interest. Other exhibit kiosks have multiple videos, or instructive sessions. There are also some videos and display material remaining from the Department of Energy information centers. Because original material was not available, these original Department of Energy displays have been adapted to run on the touch screen displays

## THE YUCCA MOUNTAIN EXHIBITS

The Yucca Mountain exhibit is developed around several interactive video displays (Figure 2). The state-of-the-art touch screen monitors that host each exhibit provide a unique and engaging platform for people to interact with the information. Visitors are able to easily find specific information in which they may be interested. Images, video and vocal information all work as one to tell the story each exhibit has to share with the visitors of the museum. These displays allow users to explore the underground test programs, and see information on radiation safety, transportation safety, nuclear reactor fuel and waste products, the science of the Yucca Mountain project, and geotechnical issues that are important to Nye County. The ancillary materials include exhibits on spent fuel, a one-third scale model of the exploratory studies facility tunnel daylighting, and a simulated drill rig.

The Yucca Mountain Project exhibits are located in the south building of the museum. Nye County developed these exhibits so that people who wanted to understand the Yucca Mountain Project would have a place to find that information.



Figure 2. Yucca Mountain exhibit interactive displays

Just after the entrance to the south building, there is a small theater. In that theater is a video that presents a brief overview of the Yucca Mountain Project and an introduction to the exhibits. At the completion of the introductory video material, there is a narrated slide show that presents

background and overview historical material about the Yucca Mountain project. If a visitor only has a short time to visit the Museum, this background material provides a concise overview of material in the Museum exhibits.

Outside the theater, there are several exhibits that deal with the study of Yucca Mountain. There is no particular order for viewing the exhibits. They are set up to be self guiding and most contain a significant amount of information. The exhibits deal with technical subjects, and every effort has been made to ensure that the material is understandable.

Many people are uncomfortable with the idea of radiation. To help visitors learn more about the subject of radiation, a display on radiation and radiation safety has been developed. Radiation and its effects are important considerations for repository safety, and they are also of interest to citizens of Nye County because the Nevada National Security Site is located there. An understanding of radiation could help in understanding some of the other displays, so visitors are encouraged to consider looking at the Radiation Safety display before visiting the other displays.

Along the east wall there is a display with a video called “The Making of an Underground Laboratory.” That video explains the site characterization studies that were done by the Department of Energy to collect information about the mountain that was used in documents such as the License Application.

The wastes that would have been disposed in a repository at Yucca Mountain are solid ceramics and glass, encased in metal. The next exhibits along the east wall include full scale models of a spent fuel element, which would be used in a reactor, and a high-level radioactive waste container, which would contain glass made from reprocessing wastes.

The video display accompanying this exhibit has three videos. One shows highlights of operations at a nuclear power plant related to the fuel and its handling. Another video shows the operations at the Defense Waste Processing Facility, where high level wastes are turned into glass for emplacement in a repository. The wastes would be placed underground by remote handling equipment. The third video shows how the proposed Yucca Mountain Initial handling Facility would have taken the waste from a transportation container and prepared it for emplacement underground.

The southern portion of the Yucca Mountain exhibit is dominated by a one-third scale photograph of the cutter head of the tunnel boring machine that excavated the exploratory studies facility. There are also videos and photographs of the tunnel and the scientific studies done there.

Located between the full scale models of a spent fuel element and the high-level radioactive waste container is an exhibit that discusses the history of the Yucca Mountain project in detail. Here a visitor can listen to speakers talk about activities and decisions that occurred at various times in the nearly thirty year history of the project. This display allows someone who wants to take the time to study the history of the program an opportunity to do so.

There are two other exhibits that are on displays in the center of the exhibit area.

One of these exhibits is on safely transporting the wastes, which is of concern to everyone. There are three videos in this exhibit. One, prepared by the Nuclear Energy Institute provides a detailed overview of transportation safety. A second video shows tests that were performed to demonstrate the safety of the shipping containers, including running locomotives into the containers. The third video shows details on how shipping containers are constructed.

There is an exhibit on “Assessing the Future Safety of a Repository at Yucca Mountain. This interactive display allows a visitor to explore the Yucca Mountain safety assessments and the science behind them in great detail. Like the history exhibit, this display is a research tool that provides a look into the details of the science of the Yucca Mountain Project. It was prepared by the Department of Energy several years before the License Application was submitted. While the scientific information presented in the display is consistent with that used for the License Application, the Environmental Protection Agency regulations changed slightly before the application was submitted. The analyses to show compliance with the Environmental Protection Agency regulations that are in the License Application could not be appended to this video; instead, they are included in the display on Radiation Safety.

Nye County scientists also studied Yucca Mountain. There is a display that explains the geologic investigations that were undertaken by the Nye County Scientific Investigations Program. Incidentally, the work done by Nye County Scientists was used by the Department of Energy in its License Application.

An important ancillary display to the Yucca Mountain exhibit is a display developed with material loaned to the Pahrump Valley Museum by the Atomic Testing Museum in Las Vegas. This exhibit documents the history of atomic testing at the Nevada Test Site (now known as the Nevada National Security Site). There are numerous poster displays showing the many activities that took place at the Test Site.

## **YUCCA MOUNTAIN ORAL HISTORIES**

An activity accompanying the development of the Pahrump Valley Museum involved documenting aspects of the history of the Yucca Mountain project. This consisted of interviews and the preparation of oral histories of a number of people involved in the Yucca Mountain program throughout its history. Scientists who worked on the program, managers, and important opponents were interviewed. The oral histories are in the process of being published; the following information is an initial summary and reaction to the materials that will be documented when the interviews are published

The interviews were designed to document the activities related to the search for a suitable site for disposal (permanent storage) of the nation’s used high-level spent nuclear fuel, referred to, somewhat inappropriately, as nuclear waste or high-level nuclear waste. The interviews cover the history of the program, and focus on the initial activities as the program got underway in the 1970s and became seriously focused after Congress passed the Nuclear Waste Policy Act in December 1982. The interviewers sought to document information about why Yucca Mountain,

located in Nye County, Nevada, was recognized as a potential high-quality site early on, and what led to and what were the consequences of the 1987 amendment to the 1982 legislation that singled out Yucca Mountain as the nation's only site for an intense suitability study.

In the years up to the present hiatus (2011), an enormous amount of time, scientific study, and money (an estimated \$11 billion of a total of \$15.4 billion) was spent on determining the suitability of Yucca Mountain for permanent storage of spent nuclear fuel. Yucca Mountain is sometimes said to have received the most intense scientific scrutiny of any site on earth. The interviews sought to document information regarding how that money was spent.

It is not clear what the future of a high-level spent nuclear fuel repository at Yucca Mountain is at this point. Perhaps the site will be permanently abandoned, or perhaps, with a change in political climate, it might get back on track. Either way, it will be useful to know what happened: What went right with Yucca Mountain? What went wrong? If Yucca Mountain is revived, past successes can be incorporated into future efforts and previous mistakes avoided. If Yucca Mountain is not revived, one or more repositories will have to be built at some point in the future, and such new efforts can surely benefit from the Yucca Mountain experience. Moreover, the Yucca Mountain story is an interesting one, and the insights of its participants could shed light on other large-scale human endeavors.

In order to provide documentation to help interested stakeholders better understand the history of Yucca Mountain, eleven oral history interviews were conducted with key figures in the Yucca Mountain effort, including onsite program officials, project scientists, and Nye County officials. In an effort to give a broad and hopefully fair perspective on the matter, two prominent Nevadans, Senator Richard Bryan and Bob Loux, both strongly opposed to Yucca Mountain, were also interviewed. In addition, the text of an interview conducted earlier by the author with U.S. Senator Chic Hecht regarding his views on Yucca Mountain is included.

The twelve oral histories contain information on the interviewees' background and education, their involvement in the repository effort, and recollections regarding the overall program and its strengths and weaknesses.

The interviews were professionally transcribed and lightly edited and the edited text approved by the interviewee. Each document was professionally proofread and indexed and bound in hard copy; these books will be placed at libraries and museums throughout Nye County and at the University of Nevada, Reno; the University of Nevada, Las Vegas; and the Nevada State Historical Society in Reno. In addition, digital copies of each interview will be available through Amazon and other electronic websites. The interviews range in length from 40 to nearly 500 pages.

The interviews were conducted with Steve Bradhurst, Senator Richard Bryan, Dr. Thomas Cotton, Dr. Russ Dyer, Dr. Ned Elkins, Senator Chic Hecht, Gary Hollis, Darrell Lacy, Bob Loux, Dr. Donald Vieth, Dr. Michael Voegele, Troy Wade, and Dr. Jean Younker.

These oral histories present a very different and much richer overall view of the more than three decade-old Yucca Mountain effort than that offered by mainstream media over the years. First,

from a strictly technical and scientific point of view, the interviews document the positions of a number of internationally known scientists that there is absolutely nothing wrong with Yucca Mountain as a site to safely store high-level nuclear waste for tens of thousands of years. There is nearly unanimous agreement on this point among the very large number of scientists and engineers who worked on the project and were familiar with it. The very few highly publicized scientists who questioned the safety of a repository at Yucca Mountain over the years are seen as science outliers, representing the kind of contrarian view, however valid or invalid, that can be found on virtually any scientific issue.

Those interviewed who were opposed to Yucca Mountain, Senator Richard Bryan and Bob Loux did not say they opposed the repository on scientific grounds. Instead, Senator Bryan made it clear that his opposition was based on his overall distrust of the U.S. Department of Energy and the failure of its predecessor, the Atomic Energy Commission, to fully protect the public during nuclear weapons testing at the Nevada Test Site, especially, but not exclusively, in the years prior to the end of atmospheric testing. He said he simply had no faith in the Department of Energy's ability to build a safe repository. He was also concerned with the fairness issue; why should Nevada, which has no generation of nuclear power, be saddled with storing waste for those states that benefit from its production?

Bob Loux, in his role as Nevada's anti-repository point man, was basically interested in delay and obfuscation of the Yucca Mountain project. In his interview, he states his strategy was that if the project could be delayed long enough, it would likely go away.

The interviews indicate that Senator Bryan and Bob Loux's stated reasons for opposing Yucca Mountain lie at the heart of why the effort has now floundered. Early on, the Department of Energy had been advised by contractors that the real challenges in building a safe high-level nuclear waste repository were social, not technical. There was never any real doubt that scientists and engineers could construct a facility for the safe long-term containment of high-level nuclear waste. Whether or not the social challenges, the forces of opposition, could be adequately dealt with, however, was not a given.

The interviews also have a common theme indicating that high-ranking officials at the Department of Energy as well as the authors of the Nuclear Waste Policy Act (1982) as amended in 1987 and the nuclear industry seem not to have heard this warning; at least, they did not heed it. Instead, Yucca Mountain was more like business as usual for the Department of Energy. The entire effort moved blithely along for years as if there were no need to address the sociopolitical issues. When officials at the Department of Energy and other proponents began to appreciate better the social challenges, it was too little, too late.

The in-depth experience with the Yucca Mountain project that the interviewees shared with the interviewers lead to the identification of a number of nontechnical mistakes made and lessons learned. Apart from the technical issues, socially based mistakes were made at all levels, by legislators, the DOE, and the nuclear industry; the interviews suggest that there are insights to be gained from the mistakes:



- From the outset, those responsible for developing a repository at Yucca Mountain had little understanding of what people in Nevada and in the local communities thought about the project, or of the cultural, social, and political dynamics shaping those attitudes. If officials had understood such matters, they likely would have been able to address them successfully. Instead, Yucca Mountain was handled as if it were just another project in which state and local concerns were largely irrelevant.
- There was never a serious effort made on the part of those in charge of the repository program to adequately educate the public regarding nuclear power and spent fuel storage issues. Throughout the Yucca Mountain project's history, federal legislators, DOE, and the nuclear industry gave Yucca Mountain opponents a free hand in shaping public perception without challenge. Over the years, this free ride took its toll, causing many Nevadans, especially those in Las Vegas and Clark County, to become negative on the effort, particularly in the critical early years.
- DOE should never have been put in charge of the development of Yucca Mountain. For example, a publicly held corporation on the model of the Tennessee Valley Authority (TVA) given responsibility for developing a repository would have provided some isolation of the overall effort from the meanderings and occasional flash floods of opportunistic politics and negative opinion. As the late Senator Chic Hecht said, "Fear, [even when it is irrational], makes a wonderful issue for a politician."
- The Nevada state government should not have been give the power of veto over, or even a strong voice in, the construction of the Yucca Mountain repository without a bilateral, enforceable, cooperative agreement; to do so was a prescription for failure. This raises the question, "Could this have been done in a democratic republic without the State's concurrence?" The answer is, "Yes; it is done all the time in establishing national forests and wilderness areas and with pollution laws, civil rights enforcement, etc." In fact, all of the land needed for development of the Yucca Mountain repository is federally controlled. Furthermore, approximately 98% of the land in Nye County is under federal control, which further confounds state's rights questions.
- The strongest focus for public outreach and communication in the development of a repository should be on the communities directly impacted by the facility and not at the state level as was done in the case of Yucca Mountain. Extraordinary effort should have been made from the beginning to hire and involve local people in the project to the maximum level possible, so as to infuse economic benefits from the project into the community from the start, thus helping to build strong long-term local support.
- At the outset, it should have been made clear that multi-billion dollar grants from the federal government or the industry would accompany the state and local communities' acceptance of the repository. The interviews show that when it became obvious that there were serious problems with Nevada officials' opposition to Yucca Mountain, large offers were tendered. However, there was a problem with the late date of the offers as well as the manner in which they were made.

- At one point, Nevada was offered a multi-billion dollar nuclear energy and nuclear medicine research facility, to be placed on the Nevada Test Site and affiliated with the University of Nevada Las Vegas, as a reward for accepting the repository. The offer was made by the then-U.S. Secretary of Energy John Harrington to U.S. Senator Chic Hecht. But the offer was never made public and by then, anti-repository feeling in higher government circles in Nevada was pronounced. On another occasion, the Nuclear Energy Institute informally offered to fund construction of the super conductor/super collider in Nevada as well to underwrite construction of a super train from Las Vegas to Los Angeles, among other things, if Nevada would accept the repository. But again, this offer was informal and was never publicized and went nowhere. Department of Energy wouldn't even fund Nye County's plans for a science museum.

An important conclusion that can be drawn from the interviews is that construction of a repository in Nevada should have been conceptualized as but the first step in transforming the economy of central Nevada by turning part of the Nevada National Security Site and adjoining area into a world-class energy production and energy research center.

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