

US NUCLEAR ENERGY FOUNDATION
"Nuclear Advocacy through Grassroots Education"

Grant Application Proposal a Public Educational Media Campaign

**Bringing Grassroots Nevada Public to Approval of the
Yucca Mountain Nuclear Repository**

US NUCLEAR ENERGY FOUNDATION

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Director, US Nuclear Energy Foundation



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“Nuclear Advocacy through Grassroots Education”

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Dear friends:

The USNEF foundation originated its mission in 2006 based on two primary objectives for the grassroots education of America's citizens, 1) Educational materials and public presentations advocating the expansion of nuclear energy and 2) Educational materials and public presentations advocating the approval and construction of the Yucca Mountain Spent Nuclear Fuels storage facility.

The following is a draft of our Grant Application Proposal. The fact remains that our country must locate a “**community and state-friendly**” site for America's spent nuclear fuel storage repository. The mission of our grant application is to secure funding directly and specifically for providing Nevada's grassroots citizens with educational survey materials via direct household mail, TV and radio educational information to provide the public the facts behind the science and engineering of the Yucca Mountain Repository. The initial Executive Summaries of the Application Review Process have proven Yucca as a safe and secure sustainable repository. After our grassroots education program is accomplished, this public consensus must bring the public voice to Nevada's political bureaucracy as the voice of the people. If the public voice continues to be ignored, then we must bring this issue to a **Public Referendum** to invoke the peoples voice.

Our program calls for 3, 50,000 letter and survey mailings to Nevada households, (150,000). 2,800 TV and radio spots and social media video ads in Reno and Las Vegas and rural Nevada. These materials will be designed to provide facts about the engineering and how those facts will provide the safety and long term security of the Yucca Mountain Repository. The end of this document is a spreadsheet of detailed TV and radio stations in Reno and Las Vegas which allocate this \$2.9-million-dollar educational grant request.

The information we have presented in this Grant Application Outline is provided to document an overview of the Yucca Mountain Project and its importance and safety to Nevada citizens and the people of our entire country.

Gary J. Duarte, Director

It is important to inject this assessment at the beginning of this document:

The Nuclear Waste Impasse Can Only Be Resolved by the public

The more we review the Yucca Mountain “political boondoggle” the more we are convinced the answer will have to come from the public. At the outset of the Yucca startup the DOE maintained the (Office of Civilian Radioactive Waste Management) in Las Vegas for several years, they were providing tours to the Yucca Mountain facility to familiarize the public with the science and engineering study. It is our assessment that not enough grassroots people had toured the facility. We have long estimated that Yucca has never been opposed by the public but rather a political-business opposition driven by contributions to political campaigns via the casino stakeholders. The casino industry was sold the story that Yucca Mountain would kill the Nevada tourism business. This is actually a story with no merit at all. An example of this is the Areva company in France is one of the largest nuclear reprocessing companies worldwide. AREVA receives 250 inquiries annually for educational visitations to their reprocessing center in La Hague France. People are interested in nuclear technology if they are allowed to be exposed to it.

With the casino industry and political structures united, the only way to reverse this is through grassroots education. Without an adequate public education campaign to include direct mail, television, radio, etc. the public will not receive a sufficient understanding to voice a platform for an open dialogue. The public seem to be more amenable to processing common sense than politicians are. The example of this is, most political issues between the parties in Washington DC fail at reaching a resolution because of “party position” rather than cooperative common sense.

It is reasonably well accepted that once public opinion reaches a point of agreement they can, and do influence the political positions of elected officials in order to protect their votes. This is what is required to move the Yucca Mountain quagmire forward. There is no best place on the planet for spent nuclear fuel. Yucca was one of eight or ten evaluated locations, it may not be the best, but, it certainly achieves being “reasonably acceptable”. This is what the science and engineering study is meant to prove. This definitive proof is forthcoming with the completion of the Yucca Mountain Application Review Process. The public is sick and tired of unfounded, uncooperative political opposition. Nearly every contention concerning the Yucca site made by the Nevada Agency for Nuclear Projects is expected to be adjudicated by the Atomic Safety and Licensing Board. This Nevada agency has never been headed by a scientist or engineer. How much more do our citizens want to allow Nevada to extend these ill-founded contentions when such a technical agency is not managed by a qualified scientist?

We have to offload this responsibility to the state of Nevada, their actions have severely delayed the Yucca Mountain facility from being completed. Because of this, the Department of Energy has been sued by some 45 utility companies and in the majority of cases, the government has lost these lawsuits and our taxpayers are on the hook for what is expected to add up to an estimated \$30 billion dollars. After a while, it becomes irrelevant as to which side of the politics you are on. At some point, we have to inject common sense and get on with the program. This has never been a trivial program. Such a contentious opposition by self-serving politicians and the single State of Nevada, is definitely egregious to the well-being of this country. We firmly believe that when the grassroots public are given and educated understanding of the situation they will likely vote to replace the political obstructionists.

Over the years, the nuclear industry commissioned the lobby group, Nuclear Energy Institute to develop a public relations program for Yucca Mountain, in 2006 sending a full-time staffer to Nevada for this purpose. They have conflicts, because this lobbying world attempts to remain apolitical. This becomes somewhat of an oxymoron when you consider that the politics of the issue are caused by the politicians. The industry has never pursued a national educational program to continue the 1953 message from President Eisenhower on “Atoms for Peace”. He laid the foundation for the program, a message that was badly needed by the public, to offset our use of the atomic bomb to

end World War II and it seems the industry decided to let the DOE handle the education task when both entities should have picked up the gauntlet in support of educating the grassroots on “Atoms for Peace, nuclear technology.

Without a unified path by both the DOE and the nuclear industry, the fight for Yucca was reduced to NIMBY Nevada state politics to oppose the 1982 Nuclear Waste Policy Act, Congressional law. The final selection of Yucca is irrelevant. Its science and engineering are acceptable, nothing will ever prove to be perfect. We have to educate the public to vote for common sense versus political obstruction. If the industry and its association are not willing to risk their political correctness for Yucca the public opinion will be overruled by the politics. It is politics that made Yucca political, but, the industry fears fighting the politics because much of the nuclear industry thrives on government contracts, e.g. “don’t upset the check-writer”.

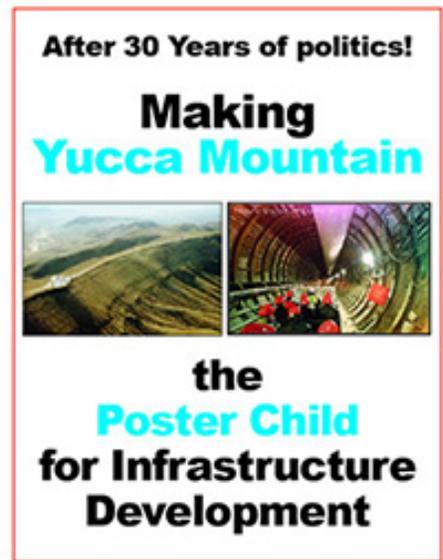
There will be no resolution to the Yucca Mountain issue until such time that the industry and its associations and the DOE are willing to educate the Nevada grassroots public to the science engineering and common sense of making Yucca Mountain a workable nuclear repository for service to the country. The US Nuclear Energy Foundation has been addressing this task in northern Nevada the past decade. Once the public here understand the truth they will support the Yucca program, a majority of Northern Nevada people support Yucca. We have not had the resources to establish a presence in Southern Nevada. Las Vegas, in Clark County is the home of the casino industry, its money, and where the largest public educational battle needs to be fought.

It may well be another oxymoron to attempt to unite the public, government agencies, politicians, and the nuclear industry to a cohesive dialogue about the Yucca Mountain repository, but, this is what has to be done.

Gary J. Duarte, USNEF



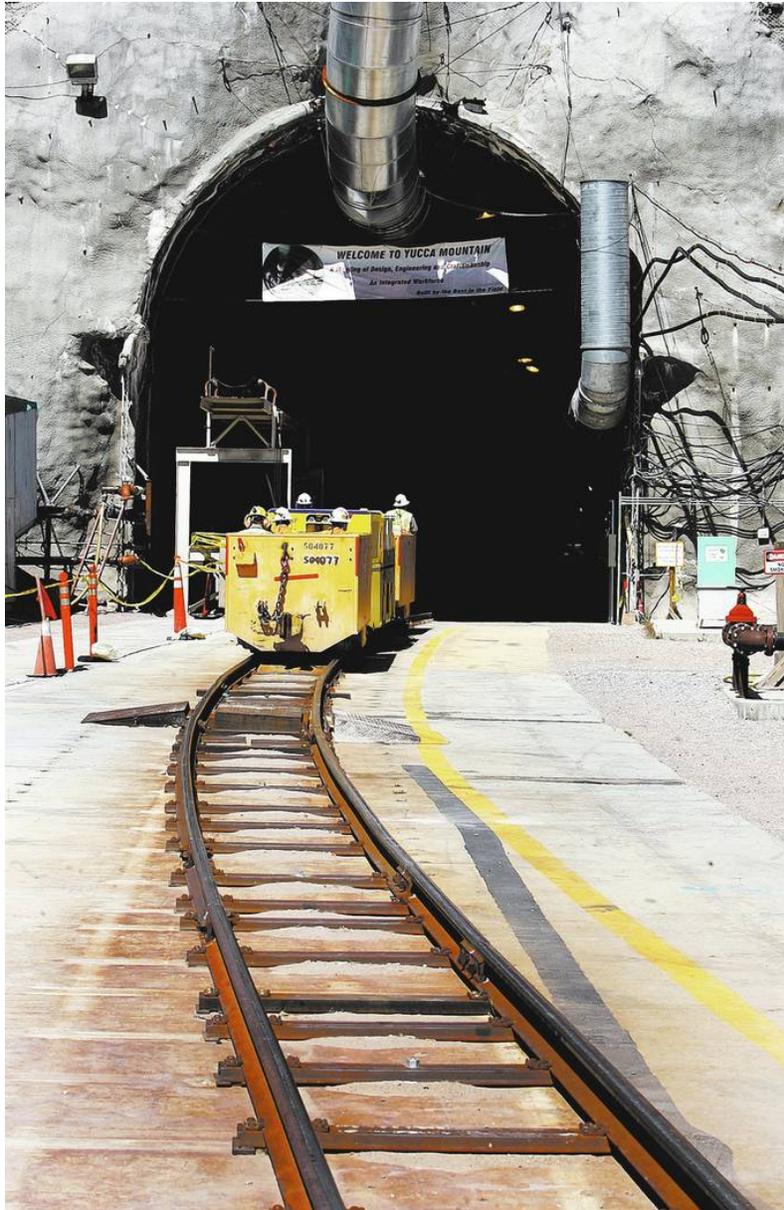
President Eisenhower’s, U.N. address, Atoms for Peace 1953



Executive Summary / Description of Request / Grant Management

This is an effort to provide an overview assessment of the U.S. nuclear waste program. We have assembled several articles, stories and sources which have reviewed this process for many years. The mission of our foundation has been to provide grassroots education inclusive of logic, common sense and deductive reasoning concerning the “advocacy” of nuclear energy, and spent nuclear materials in our country. Rather than rewriting this material totally we have integrated material written by others and provided our response to “paint a truthful picture” for the public as an apolitical educational program, encompassing a review of the Yucca Mountain Application Review Process.

Our dialogue responding to this documentation is indicated by a different font colored **BLUE**. Portions of an article that are deleted for space purposes are noted as **EDITED**.



Nuclear Waste Policy Act of 1982

OVERVIEW Gary J Duarte: The Nuclear Waste Policy Act of 1982 created a timetable and procedure for establishing a permanent, underground repository for high-level radioactive waste by the mid-1990s, and provided for some temporary federal storage of waste, including spent fuel from civilian nuclear reactors. State governments were authorized to veto a national government decision to place a waste repository within their borders, and the veto would stand unless both houses of Congress voted to override it. The Act also called for developing plans by 1985 to build monitored retrievable storage (MRS) facilities, where wastes could be kept for 50 to 100 years or more and then be removed for permanent disposal or for reprocessing.

Congress assigned responsibility to the **U.S. Department of Energy (DOE)** to site, construct, operate, and close a repository for the disposal of spent nuclear fuel and high-level radioactive waste. The U.S. Environmental Protection Agency (EPA) was directed to set public health and safety standards for releases of radioactive materials from a repository, and the **U.S. Nuclear Regulatory Commission (NRC)** was required to **promulgate regulations** governing construction, operation, and closure of a repository. **As time went on it became more and more apparent that this proposed permanent storage facility “should” maintain the “design capacity for retrieval of the spent nuclear fuel for optimum refinement through advanced reprocessing technology eliminating 97% of its danger.** The advancement of reprocessing technology has been partly responsible for Congress, the industry and stakeholders to reassess and delay the determination of “permanent storage” several times realizing that reprocessed spent fuel could be market competitive as new (recycled) fuel.

Power companies and owners of spent nuclear fuel and high-level radioactive waste were **required to pay the costs of disposal** of such radioactive materials. The waste program, which was expected to cost billions of dollars, would be funded through a fee paid by electric utilities on nuclear-generated electricity. An Office of Civilian Radioactive Waste Management was established in the U.S. Department of Energy (DOE) to implement the Act.

USNEF we know that our “independent” grassroots nuclear advocacy foundation evokes a “watch with interest” response from the industry, associations and government. In respect to Yucca Mountain isn’t this exactly the same that the DOE, NRC, ANS and NEI have been doing the past 30 years? Not meant as an insult, but haven’t these agencies and organizations failed the **Yucca “grassroots public relations” program?** During Yucca’s bore and analysis the DOE paraded hundreds of VIPs through the facility for educational purposes “expecting” that they would spread the word of safety and security. They failed to parade enough of the grassroots public, hairdressers, plumbers, homemakers, real estate agents, truck drivers, etc. This is why public opinion never reached the public. With science **technology advancing significantly every five years**, there will **never** be a “**science and bureaucratic right time**” to ever advance the spent nuclear fuel storage cycle. In time (estimated 30-years) we will accomplish 100% spent fuel cycle management. “In the meantime” remains the spent fuel task we have to manage and store today. We cannot “wait and see” we have to act and build.

1) Nuclear Waste Policy Act of 1982:

- a. 2013 we need to update the processing, storage and reprocessing of spent fuel.

Sometimes it helps to analyze “our position” based on the plans of others. Below is an excerpt from a 2013 report, **UK Nuclear Energy Research and Development Roadmap: Future Pathways**

Annex D - Advanced Fuel Cycles:

In addition to conducting R&D to improve current fuel cycle technologies, significant effort is being devoted to the development of advanced fuel cycle technologies. For many countries, R&D on advanced fuel cycles and nuclear systems is being undertaken within co-operative programs (e.g. the Generation IV International Forum (GIF), the IAEA International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO), the International Framework of Nuclear Energy Cooperation (IFNEC) and European Commission’s Framework 7 Program projects. [USNEF – in the early years the U.S. was responsible for initiating many of these worldwide co-operatives and in recent years we have withdrawn from “some” of them. Having stated numerous times that America was the founding father of nuclear energy development; we should not restrict any opportunity to advance nuclear technology co-operatively worldwide.](#) Actinide Recycling by Separation and Transmutation (ACSEPT) project and the Advanced Fuels for Generation IV Reactors: Reprocessing and Dissolution (ASGARD) project). The objectives of the longer term advanced fuel cycle concepts under investigation include reducing the mass and radiotoxicity of wastes for final disposal, optimizing the use of natural resources and enhancing proliferation resistance features, by not separating out plutonium in isolation.

Alongside the development of fast neutron reactors and advanced fuels, advanced processing methods are being developed to **close the fuel cycle and recycle the actinides**. Current reprocessing and recycling methods involve the removal of uranium and plutonium from the spent fuel, with minor actinides (e.g. neptunium, americium and curium) and fission products remaining in the waste stream. Advanced processing techniques are being developed for the selective separation (partitioning) of the long-lived radioisotopes within the spent fuel, including minor actinides and possibly some fission products. These radioisotopes may then be transformed into shorter-lived radioisotopes (transmutation), either in fast reactors or in accelerator-driven systems. Alternatively, the separated isotopes can be vitrified as waste and disposed of separately. [USNEF- the ultimate goal of the “closed fuel cycle” is to eliminate all remaining high-level by-products by burning them as “part” of the fuel in 4th generation advanced fuel cycle reactors. Research has concluded that we “can” accomplish this as the technologies extend beyond research into functioning systems.](#)

There are two main categories of advanced fuel cycles. In the first, the separated minor actinides may be mixed directly with the fuel (homogeneous transmutation) or incorporated into dedicated targets (heterogeneous transmutation), with the fuel cycle combining the use of, typically, LWR reactors and low conversion ratio fast reactors or accelerator driven systems. The second category comprises a fully closed fuel cycle with the combined treatment of transuranics (including minor actinides) and plutonium as fuel in fast reactors, with the ability to multi-recycle plutonium and uranium. [USNEF – accordingly, based on some 30 years of research, we know that within the next half century nuclear technology will be able to completely eliminate \(our old\) high level radioactive waste by burning it after reprocessing preparation in the next generation accelerator-driven fast reactors. Knowing this ability is on our horizon, logically, eliminates most future concerns about safety, making all discussions about long term large volume storage moot. This is the basis from which we must educate our Nevada and U.S. citizens concerning the politics of delay and the science of facts.](#)

- b. **USNEF** – Government has not “provided” the Yucca facility as directed by law. They continue to collect nuclear waste funds “fees” (finally terminated) while “talking about reprocessing and storage technology” and still not providing the storage facility from which that inventory could be reprocessed in the future. We have recognized from the beginning that spent nuclear fuel has always been a national security issue that Washington and its “agencies” needed to “solve”. It is the position of **USNEF** that Washington’s deadlock on this issue must be turned over to the public and private industry for resolution and implementation. The development of our first atomic bomb for rendering an end to World War II was a national security issue which required large amounts of refined high level radioactive material and later waste. The offloading of this inventory as originally planned is also destined for Yucca Mountain and yet ANOTHER need for national security consideration. Washington must put the needs of America beyond the NIMBY position of an individual state and the importance of clean nuclear energy must be supported by the public and separated from our politics. This can only be accomplished through

the education of our citizens about this political road blocking by making the facts available to the public.

2) 30 Years of misinformation concerning the Yucca Mountain science to Nevada's public:

USNEF - Few can argue that the Yucca Mountain Project has been a conundrum for this country for too many years. It is evident that the DOE was unable to paint an acceptable program for the Nevada bureaucracy, because basically there was no funding stream for the state as it is a federal program on federal land. The DOE apparently failed to enlighten Nevada that the influx of a 97-billion dollar construction project and years of operation would eventually generate billions in business, sales and employment taxes, etc. to Nevada. Based on the Obama administrations Blue Ribbon Commissions findings apparently it has taken 30 plus years to identify that the "siting" of a nuclear waste repository must align with a community and state approval. What failed Yucca is the fact that the DOE process apparently did not address "community-state approval" as a critical factor. They toured many VIPs through the facility meeting approval but failed at educating the grassroots.

When the state bureaucracy found itself not getting a revenue stream they decided to oppose the project by attacking the DOE and the science of the study. Consequently, the "media" dialogue concerning Yucca was overrun with negative coverage resulting in a misinformed grassroots public. The bureaucracy also convinced Nevada's casino industry, and they foolishly believe that a nuclear waste repository would distract the tourism business from coming to Nevada. (The French company Areva gets 250 requests annually for tours of their nuclear reprocessing facility).

- a. We would like to demonstrate a 30 year analysis of negative Yucca media coverage but we just don't have the time and resources for this study. However we do feel that it is extremely important as with many issues unfairly influenced by media coverage that the educational truth be available to citizens. In the case of Yucca Mountain we must avail the public to the facts of its scientific findings which were documented in the application process.
- b. We are concerned that the **misinformation supports the politics at the expense of the citizens**. Nevada political representatives, relatives of politicians involved in green energy development display conflicts of interest. How the politics of renewable energy forcibly move private energy companies into much more costly green energy production.
- c. We need to support the original law for the Yucca facility as a permanent storage site and the Amendments Act of 2008 in order to carry through the original and amended intent of the law which is "in place". We need to identify that the facility has been delayed partly because of the advancement in both storage and reprocessing technology and it would be the full intent of implementing the "total" elimination of ALL of this "stored" spent fuel "when" nuclear science "solves" the complete closing of the fuel cycle in the near future.

3) We plan that our Yucca, citizen grassroots educational program can succeed within a 6-8-month cycle:

- a. **USNEF** will develop **three** succinct highly focused **direct mail educational print collaterals** to some **160,000 households in Nevada**. This will not be a "political photo-op" but well-structured educational messaging highlighting the critical facts and data inclusive of the Yucca application design, business, professional, straightforward and content rich information.
- b. Each mailing will build on and support the message delivered in prior mailings. Facts data and charts more than pretty photographs. We, too often undermine the ability of our citizens to comprehend factual educational content, data and give them instead sparse visual aid literature. We talk about dumbing down our marketing instead of encouraging an intellectual challenge. Junk mail receives its definition because it states nothing. Each of our mailings will contain bullet lists to highlight the specifics of its message.

- c. We will **supplement** our print materials with **500 to 700, TV and radio educational messaging** and tag them with “read reminders” of the mailings sent, “hard data” print literature being distributed to many households in the state, something they can hold, read and contemplate the message and pass along to others. (Direct mail on average is read by 3-4 recipients).
- d. We can make the “print collaterals” available to the business community for “free handout distribution” to their business customers further extending the grassroots education.

4) The finalizing messaging will detail the potential economic impact of the Yucca Nuclear Waste Repository:

- a. The economic impact of Yucca Mountain as a storage facility has not been made radially available to Nevada’s citizens. Several entities have done economic studies with a potential business model including the University of Nevada Las Vegas and The Boston Consulting Group. The ongoing nuclear waste fund will provide the sustainability of the storage program. The advancement of science will eventually validate the economics of total waste reprocessing.
- b. As the planned Yucca permanent storage facility is constructed, the designs in recent years, call for the ability for the future removal of this “spent fuel” as our “reprocessing technology” advances to the capacity for total reprocessing. The first step the public needs to take is the necessary to develop an “operating entity”, to include public representation to overview and the “business model” and to satisfy the “government specification” for its operation.
- c. The second task, receiving much discussion in recent years is the eventual development of a “commercial size” reprocessing facility for our current 66,000 tons and the additions over the next 20 years. Several years down the road, when the cost of reprocessing attains efficiency, this inventory will be worth an estimated 14 trillion dollars. The economics of nuclear technology must be “amortized” over 60-80 year timelines, nuclear is not an average business operating matrix.

Gary J. Duarte, Director
US Nuclear Energy Foundation

The Economics: The Boston Consulting Group Executive Summary 2006

ECONOMIC ASSESSMENT OF USED NUCLEAR FUEL MANAGEMENT IN THE UNITED STATES

USNEF – BCG= Boston Consulting Group. This report analyzes two primary methods of evaluation, Greenfield approach and Implementation approach comparing recycling and storing separately and the Yucca Mountain combined facility with both MOX and UOX processes. Recycled fuel was assessed based on a uranium price of \$31/lb U₃O₈, in line with the average price for the last six months of 2005. BCG assumed that enough reactors are available to absorb (re-burn) all of the recycled fuel. USNEF – our integration of this report may well be one of the more detailed analysis of this issue because its calculations were compared against the world’s largest recycling facility, in La Hague, France built and operated by AREVA. The “opinions” about the Yucca repository in Nevada, are, that it would destroy the tourism business in Nevada. The La Hague reprocessing facility in France gets 250 requests annually for public visitations.

There are four operational treatment plants in the world: the first one at La Hague, France, operating in conjunction with the MOX fuel fabrication plant at Melox, and operated by AREVA, the second one at Sellafield, U.K., operated by British Nuclear Fuels, the third one in Ozersk, Russia, operated by the Russian government (Mayak plant), and the fourth one at Rokkasho-mura, Japan, operated by Japan Nuclear Fuel Limited¹. There are currently no operational repositories for commercial used fuel, while some are currently in the development or licensing phase (e.g., Yucca Mountain, U.S.,

Olkiluoto, Finland). [USNEF](#) – We wish to point out in this statement that the public in Nevada and the U.S. are not aware that nuclear fuel reprocessing has been operational for some 25 years. It is also important to note here that three of these facilities are run and managed by free market business interests with the exception of the Russian installation. As we have suggested all along, at the end of this report AREVA also recommends that the U.S. give consideration to a Public-Private Partnership for the operation of Yucca Mountain as a COMBINED reprocessing and permanent storage facility.

For the last 20 years, the U.S. has pursued development of a geologic repository solution for used fuel disposal — the **once-through strategy** — at Yucca Mountain in Nevada. The key benefits of that strategy are: **a) capacity to handle all legacy used fuel (estimated at 54,000 metric² tons** in 2005, currently stored at nuclear power plants); **b) capacity to handle additional used fuel discharged** after a period of cooling and interim storage, provided that additional repository capacity is developed; and **c) no further need for handling or processing of used fuel after disposal** which, to that extent, **makes the once-through strategy a complete lifecycle solution.** [USNEF](#) – this is the premise under which Nevada bureaucracy and its influence of the media has painted the repository picture as simply a permanent bulk storage facility. It is only “fair” to point out here that the entire industry has revived the discussion of REPROCESSING of our legacy inventory over the past 10 – 15 years because the technology has been continually improving the results of reprocessing making it more cost competitive in the marketplace. Calculations as of 2001 placed the cost of storing 83,800 tons of spent fuel at about \$48 billion dollars.

BCG Over the last decade, however, several factors have led to questions about the appropriateness of the once-through fuel cycle as an exclusive used fuel management strategy. In particular:

- Cost estimates of the once-through strategy at Yucca Mountain have significantly increased from initial estimates, in part because of increasingly stringent design requirements. Moreover, at the current rate of used fuel generation, additional repository capacity is likely to be needed for fuel discharged after 2035, even considering that Yucca Mountain capacity could be expanded to 120,000 tons.
- A long-term increase in new U.S. nuclear generation is likely — beyond the currently installed 103 GW to at least 112 GW, based on incentives in the 2005 Energy Policy Act, and potentially to 160 GW, **especially if significant carbon abatement legislation is enacted.** Thus, strategies to manage additional used fuel must be considered. [USNEF](#) – as much as current and past administrations are indecisive about the danger of carbon emissions and their atmospheric affects, Physics practically commands that the only solution to high volume carbon free energy development is nuclear power. Physics also commands that U.S. growth will require something like 40% more energy by 2050. The U.S. is considering very ambitious targets for greenhouse gas emissions that would require a reduction in energy-related **carbon dioxide releases of 80% or more** by the year 2050. A transition away from reliance on petroleum for transportation and high carbon fuels for electricity generation, nuclear hands down is more clean and productive than any other source. It will be impossible to achieve the desired emission reductions while simultaneously maintaining reasonable economic growth without revisiting nuclear technology.
- The underlying economics of alternative used fuel management solutions, such as recycling, have shifted, driven in part by higher uranium prices and by a deeper understanding of the long-term behavior of recycling byproducts, which leads to significant optimization of repository space.
- The recycling strategy has gained recognition through the demonstrated, long-term operational effectiveness of recycling technologies over more than 40 years of industrial experience, in combination with a higher level of confidence based on economic data from actual operations. This return of experience has also enabled some successive process and design improvements. [USNEF](#) – In other words the past 15 years of science and reprocessing development now prove that **the ultimate cost efficient direction** for spent fuel reduction and management is a “combined facility” of reprocessing and storage.

BCG performed an independent study, funded by AREVA, to review the economics of the back-end of the nuclear fuel cycle and, in particular, of developing a recycling strategy in the United States. The study takes into account the specificities of the U.S. context (such as the need to handle legacy fuel) and considers possible complementarities with

the current Yucca Mountain repository project. **BCG** was able to benefit from an “open-book” approach, in which AREVA provided proprietary operating and accounting data from operations at La Hague and Melox facilities. [USNEF – as we have indicated before, we place a high value on an analysis done by AREVA because they are the current world leader in reprocessing technology, knowing that the entire European community and its 30 year nuclear plant facilities would be an eventual market for reprocessing spent fuel. Also note that AREVA is a major contractor of U.S. nuclear plant maintenance employing some 4,500 people in the U.S. further extending the U.S. need to remain a world player in nuclear development.](#)

[USNEF – In regards to the two analyses done we prefer their IMPLIMENTATION study.](#) In the *Implementation* approach, **BCG** assessed a possible strategy to implement recycling in the U.S. taking into account the current U.S. context, including the existence of legacy fuel at the reactor sites and the progress toward operating a repository at Yucca Mountain. Within the Implementation approach, **BCG** considered a *portfolio strategy*, in which a recycling plant is an essential complement to operation of the Yucca Mountain repository. The Implementation approach addresses economic questions such as, “How much would it cost to implement a recycling plant in conjunction with the repository?” and “What is the cost differential between a portfolio strategy and a once-through strategy in which only repositories are developed?”

Recycled fuel was assessed based on a uranium price of \$31/lb U3O8, in line with average price for the last six months of 2005. BCG assumed that enough reactors are available to absorb all of the recycled fuel.

Where applicable, **BCG** leveraged AREVA know-how and proprietary data from over twenty years of nuclear recycling experience. The data from AREVA operations, supplemented by site visits and additional analyses, were used by BCG as a starting point for an independent third-party assessment of the recycling strategy. BCG triangulated on and verified key economic drivers — particularly those related to recycling — using its experience in industrial cost assessment, the value of scale, operating experience, and the like. In addition, BCG developed bottom-up estimates and triangulations for key gaps, such as transport and storage. Finally, BCG leveraged existing publicly available sources of information on repository economics, updating them for known and accepted changes.

The cost of the recycling strategy is comparable to the cost of the once-through strategy (about 5 percent difference), considering intrinsic uncertainties encompassing the assumptions used in the study. BCG looked at several variables from the unit cost model, including repository costs, uranium prices, cost to manage used MOX, discount rate, and integrated plant costs. The impact of uncertainties surrounding each of these variables on the cost differential between the two strategies is in the order of or larger than 5 percent.

The portfolio strategy is illustrated in Figure 3. An integrated recycling plant is complementary to the Yucca Mountain repository, which would receive a significant amount of legacy used fuel, in addition to HLW-R. The recycling plant, expected to be operational by 2020, [USNEF – “should have been”!](#) accepts all of the used fuel discharged after 2020 and a portion of the legacy fuel, which is treated in dilution with the new fuel. Over the course of the recycling plant’s 50-year lifetime, about 40 percent of the legacy fuel existing in 2020 would be recycled¹¹, while the balance goes directly into the repository. Operation of an integrated recycling plant by 2020 is based on existing and proven technology, enhanced for known experience and optimization opportunities

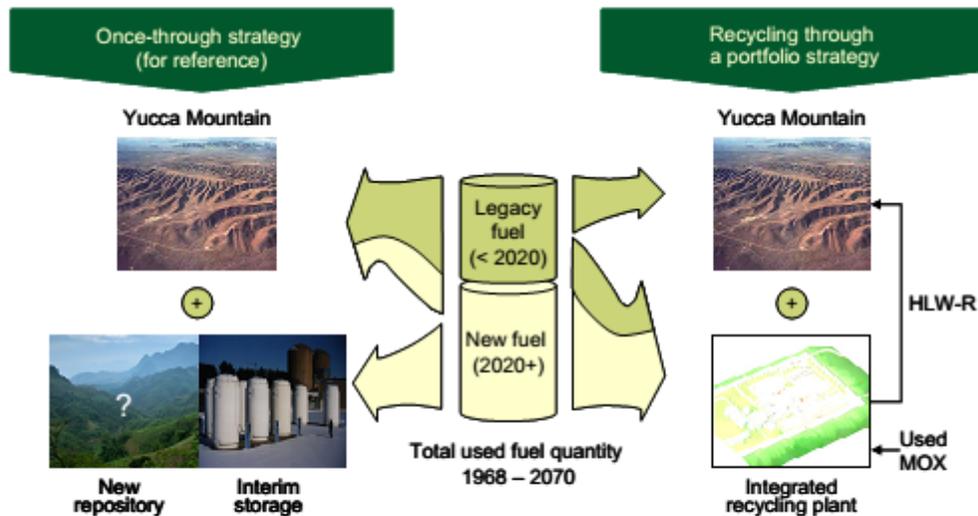


Figure 3: Portfolio vs. once-through strategy (Implementation approach)

The portfolio strategy has a total net present cost of \$48-53B Billion, while the net present cost of an exclusively once-through strategy with Yucca Mountain and an additional repository is estimated at \$47-50Billion. The total undiscounted life cycle cost of the portfolio strategy is around \$113 Billion, compared to \$124-130 Billion for the once-through strategy. Once again, given the intrinsic uncertainties of the assumptions used in this study, the economics of the two strategies are comparable. [USNEF – this is one of the few studies that demonstrates that the reprocessing model is very competitive and given the public’s interest in environmental conservation, when educated the public would more likely support the reprocessing model.](#)

From a financing perspective, the portfolio strategy shows cash flow requirements that could fit until 2030 within the current financing resources available for the once-through strategy, or even until 2050+ if acceptance of used fuel at Yucca Mountain begins only after the first years of operation of the recycling plant.

COST OF MANAGING USED MOX

Used MOX accumulates in the recycling strategy at a rate of about 300 tons/year, and there are several solutions available for managing it. From an economic standpoint, the most beneficial is the fabrication of fuel for fast reactors, in which the valuable material contained in used MOX is re-used. Other possibilities include recycling MOX a second time, or multiple times, and using advanced technologies for americium removal. [USNEF – this point also moves in concert with our point that another 50 years of nuclear technology advancement will deliver substantial improvements to our ability to eliminate current and future radioactive wastes from our nuclear systems.](#)

COST OF INTEGRATED RECYCLING PLANT IN THE U.S.

An industrial approach was used to translate otherwise proprietary information on costs at AREVA’s existing European plants (La Hague and Melox) into cost projections for the introduction of a state-of-the-art, large scale, integrated recycling plant in the U.S.. This approach is a departure from previous studies that were based on publicly available data. [USNEF – this is crucial as it provides real world data on a 20 year old existing facility. In the U.S. a reprocessing facility is a “new business” when you go to the bankers for funding, and their proverbial question, “what is your track record”? We can provide the comparison data to establish economic sustainability.](#)

An industrial approach was used to translate otherwise proprietary information on costs at AREVA's existing European plants (La Hague and Melox) into cost projections for the introduction of a state-of-the-art, large scale, integrated recycling plant in the U.S.. This approach is a departure from previous studies that were based on publicly available data.

The integrated recycling plant unit costs (about \$630/kg, including cost of capital of 3%, before discounting) were developed from a bottom-up estimation of costs for a plant designed by AREVA, which would have the following characteristics:

- 2,500 tons per year of net capacity, based on effective throughput at 300 days per year (about 80 percent of nameplate capacity).
- Total capital investment (CapEx) of about \$16 Billion, which is mainly composed of overnight cost of construction at market price, contingencies, development, licensing and start-up costs; storage costs for HLW-R and used MOX are also included and decommissioning costs are considered after the closure of the plant.
- Operating costs (OpEx) of about \$900 Million per year, which include operating expenses for both treatment and fuel fabrication, running investments, estimated taxes or taxes-equivalent, and other charges.

The total capital investment required for the integrated plant is within 10 percent of the total capital investment that has been made over the years for the La Hague and Melox plants.

While the capital investments and the operational expenses of the U.S. plant are comparable to those of existing European plants, a much higher used fuel throughput is expected in the U.S. plant, because of its larger size and the higher expected utilization. Utilization is expected to be at about 80 percent of the nameplate capacity, significantly higher than the current value at La Hague — higher utilization in the U.S. is guaranteed by larger volume of newly discharged fuel and existing inventory. [USNEF – as indicated earlier the only insert that we think deserves consideration is the assessment of “modular unit designs,” if 4th generation reactors eventually provide “direct used fuel consumption” we will eventually want to scale down our used fuel reprocessing capacity.](#)

CONCLUSIONS

Recycling, as part of a portfolio strategy in which an integrated recycling plant complements the Yucca Mountain repository, could be attractive for solving the long-term used fuel management requirements of the U.S. nuclear power market.

As with all other options, the recycling strategy involves some issues that need to be addressed. In particular, successful implementation would require:

- 1) Broad-based acceptance of recycled fuel by the nuclear industry, as recycled fuel would have to be used in a significant number of reactors.
- 2) A positive legislative, policy, and financial environment for recycling.
- 3) Development of optimal solutions, such as use in fast reactors or multiple recycling, to manage the relatively limited¹⁵ quantity of used MOX fuel, yet with flexibility on the timing.
- 4) In addition, recycling, as part of a portfolio strategy, presents a number of benefits.
- 5) Eliminates the need for additional repository capacity, beyond the initial 83,800 ton capacity at Yucca Mountain, until 2070.
- 6) Contributes to early reduction of used fuel inventories at reactor sites — in particular, removing newer, hotter fuel for recycling within three years of discharge and eliminating the need for additional investments in interim storage capacity.
- 7) Relies on existing technology — with appropriate modifications — and can provide an operational transition to future technology developments such as Advanced Fuel Cycles and fast reactors.

- 8) Shows cash flow requirements that could fit until 2030 within the current financing resources available for the once-through strategy, or even until 2050+ if acceptance of used fuel at Yucca Mountain begins only after the first years of operation of the recycling plant.
- 9) Offers a tool for nuclear power sector to protect against potential rises in uranium prices, by providing MOX and recycled UOX fuel, whose production cost is independent of uranium prices and enrichment costs.

The benefits are compelling enough to warrant further consideration of recycling as a complementary approach to developing the Yucca Mountain capacity.

BCG recommends a range of next steps:

- 1) Pursuing a **constructive dialog among key policy makers and industry leaders** on the results of this and other recent fuel cycle management initiatives. The objective of such an effort would be consensus on the possible merits of the recycling portfolio strategy and other available strategies, with identification of a limited set of issues to be addressed.
- 2) Developing a detailed business plan for the recycling portfolio strategy that considers:
 - a. additional technical aspects such as development of a **complete technical road map**, including comprehensive deployment timeline and implied licensing/ approvals, management of used MOX fuel, and the like.
 - b. Commercial aspects such as funding and operational mechanisms and the potential **for public-private partnerships**. – Policy aspects such as non-proliferation.
- 3) Building on the above steps and developing an overall roadmap.

USNEF – Basically this study validates the Yucca Mountain Project economics of storage and reprocessing sustainability. It is unfortunate that we have to take this position but the truth is that Washington has NOT been able to “solve” this issue over the past 30 years and it is evident that the only avenue to move it forward is educating the citizens of Nevada to proponents of Yucca Mountain and passing legislation to reverse Nevada’s political opposition.

How and why our Yucca grassroots educational program will succeed.

USNEF – We will develop three succinct highly focused direct mail educational items to many households and businesses in Nevada. We understand the difficulties when communicating technical information to the general public. We also understand the premise of industry strategists will tend to reduce the amount of technical information we need to provide. Somehow we need to achieve a balanced approach in developing these messages in order to get our mission accomplished.

Each mailing will build and support the data provided in the first and second mailings while at the same time reinforcing our message talking points and driving home our ultimate goal and action items. Our educational mission will provide facts, data and real charts more than slick, glitzy, graphic art presentations. We too often undermine the ability of our citizens to comprehend factual data and give them instead sparse uninformative information as we see distributed by so many of the “political strategists” materials. Somehow with the wisdom of science we must be able to transfer our messages in plain talk in order to make our message understood.

We will supplement our print materials with radio and TV support ads and “read reminders” of the “hard data” print literature being distributed to every household in the state. Calculating how and what we need to do in order to accomplish this task is truly the task we have to solve. Few can argue that the task of communication between government, business and the public is one of the most difficult issues in communication that we must all learn to solve.

Since its inception America's dealing with spent nuclear waste has been and continues to be one of the most difficult issues to resolve between government, business and the public.

Recognizing this factor at the outset is one of the most important items in order for us to accomplish our educational mission under the plans which we have developed and critical to our success.

USNEF –

1) The final literature mailing will detail the potential economic impact of the Yucca Mountain Project.

- a. The potential economics of Yucca Mountain as a storage and reprocessing facility have not been made available to Nevada's grassroots public. The reports integrated above and comment, provide some of the economic forecasts. The challenge will be to **extract the most critical data facts** from multiple material sources for presentation to the public.
- b. The first step we need to make is establishing the facility as **SAFE** in all aspects of its construction and operation and a long-term stable economic business.
- c. The second task will be to propose to the public that the "project" could be suited to function as a **Public Private-Partnership**. This business model provides an independent business operation substantially because the partnership would run as a business, and the government would provide the technical specifications and oversight. The oversight can come from many government sources, the national laboratories, independent consulting firms, etc. A Public Private-Partnership could be a viable way to transition the program and open a massive opportunity for diversification of private business. The federal government should be satisfied that there is no direct, "bribery funding" to the State of Nevada, the public would be satisfied because of a potential **4,000 the high wage job expansion** and proliferation of new small business services. With Nevada politics being steadfastly against the Yucca program for three decades, WHY would the federal government want to be in business with the state of Nevada, but rather with the public. From a national perspective **our taxpayers** might be better served with Yucca Mountain run as a **Public-Private Corporation** managed by an executive board of statewide business executives.
- d. The critically of this mission is that we educate Nevada citizens, if necessary to challenge the elected bureaucracy by demanding a legislative referendum by a **vote of the people** accepting **Yucca Mountain as a "state friendly"** Nevada enterprise.

USNEF It is our intent that our Yucca grassroots educational mission will accomplish a voice of the people to our bureaucracy informing them that the public does have a right to a voice on the Yucca Mountain Repository. The Yucca Mountain program truly is the POSTER CHILD of grassroots Nevada. The Trump administration is planning funding for the DOE restart and complete the Yucca Mountain Application Review Process. It is the VOICE of the American people overruling the voice of the establishment and liberal politics. Americans hold the value of INDIVIDUAL ACCOUNTABILITY much higher than self-serving politicians.

The decision for the final selection in 1982 of Yucca Mountain was political. There has never been a "best place on earth". Initially, Nevada was open to the Yucca program and only changed when the politics finalized the decision. Nevada has always been a major contributor to the development of nuclear technology, vital in ending the 2nd World War. There are always mistakes made in the development of any technology and always corrections to them.

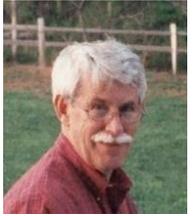
Current data on the U.S. Spent Nuclear Fuel Inventory:

In recent years there has been a renewed discussion about reprocessing technology and its competitiveness to asset generation as new nuclear fuels. In our Yucca dialogue, we seldom process that radioactive waste management is a worldwide concern in scientific discussions by many countries. Below is an excerpt from a submitted paper by Kenneth D. Kok, PE. The link below goes to his complete dissertation. His paper addressed the actual worldwide inventory of SNF. I requested from him his estimate on our U.S. currently owned inventory, the excerpt explains the rest.

USED FUEL AND DEPLETED URANIUM WORTH TRILLIONS

Link to complete paper: <http://proceedings.asmedigitalcollection.asme.org/proceeding.aspx?articleid=1832623>

American Society of Mechanical Engineers: 2013 15th International Conference on Environmental Remediation and Radioactive Waste Mgmt. Brussels, Belgium, September 8–12, 2013, Copyright © 2013 by ASME.



ABSTRACT: The purpose of this paper is to examine the energy and economic value of used nuclear fuel and depleted uranium. In the USA these materials are considered to be wastes. As such they are candidates for permanent disposal. The disposal of these materials in a manner that isolates them from human contact is a scientific, engineering, economic and political problem. Isolation can be defined requiring no potential human contact during a stated period of time due to failed containment. The period of isolation is to be in excess of one million years.

The uranium in the used fuel and the depleted uranium left over from the enrichment process represent about 99.5 percent of the uranium that was removed from the ground by mining uranium ores. If these materials can be utilized they would not be considered to be wastes. In addition, they would carry a positive economic value. The value of these materials, based on the energy that can be extracted from the uranium, (*the worldwide inventory*) exceeds \$100 trillion dollars. (*The U.S. 77,000 metric tons is valued at \$14 Trillion dollars*). Based on this, the conclusion is that the material is a very valuable resource and definitely is not a waste.

REPROCESSING TECHNOLOGY: The reprocessing technology developed in the IFR program is also unique. Reprocessing of commercial reactor fuels currently uses a wet chemical process which produces large volumes of waste. It also separates the plutonium in the used fuel as an independent product leading to safeguards related concerns.

LOGICAL PATH FORWARD: With current reactor technologies in service, worldwide reasonably assured uranium ore supply can sustain nuclear fleets for approximately 80 years. 4 Using the considerable value remaining in existing depleted uranium resources, otherwise discarded, the domestic U.S. nuclear fuel supply would then be at least 1000 years. When the IFR program was terminated in the 1990's, the next proposed step was the construction and operation of a demonstration scale reactor and fuel processing facility, as authorized in the Energy Policy Act of 1992. Licensing and building such a demonstration is the logical next step. A corporate entity or entities should be formed that takes title to both the depleted uranium and the available used fuel. The asset value of these materials would provide a basis for raising the funds for such a venture without the need for full government funding. The NRC should be charged with licensing the required facilities with the national laboratories supplying any special assistance to expedite the licensing process. Use of private funding will allow this to be accomplished with little or no new federal funding obligations.

[When does science, engineering, safety and business make more common sense than not in my backyard politics?](#)

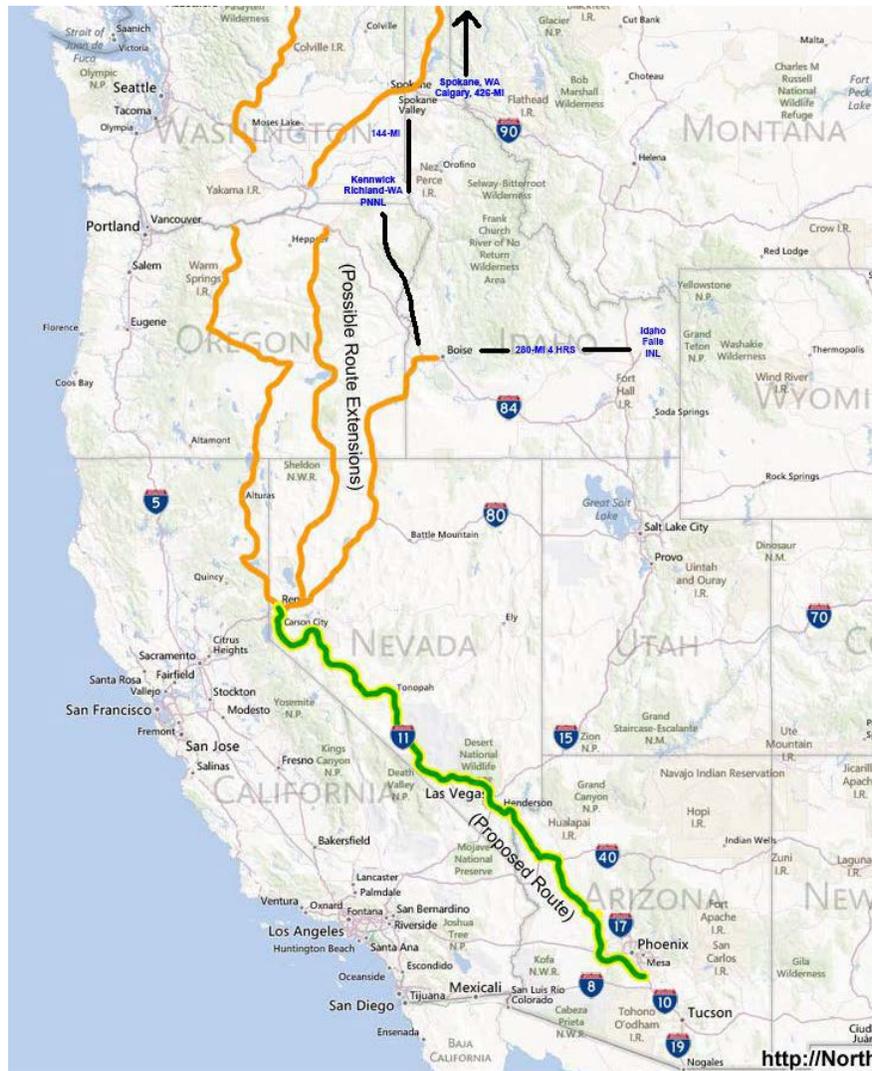
USNEF comment: Spent nuclear fuel is not a waste, but, it is not an immediate asset. We understand that the high value return on SNF reprocessing is still several years down the road as nuclear technology advances. We are sensitive about bringing the correct information to the public as there is plenty of misinformation reported in the media and “political opinion” opposed to factual dialogue. SNF is a very valuable asset that we can safely store at Yucca Mountain until reprocessing matures and is economically feasible to reprocess and this should be our game plan. Government has to figure a way to support new nuclear development as economically viable in order to secure continued engagement of the private sector. Another important point is the fact that Yucca Mountain is passed by Congressional law. It is a national requirement for the entire county. Government and the nuclear industry has allowed Nevada's nimby politics (even with 9 of Nevada's 17 counties in support) to stall the construction of Yucca Mountain without provable scientific data. This opposition has to be met with much more educational engagement by government and the industry to the public. The Nuclear Waste Policy Act is a U.S. Congressional law not a Nevada law!

Yucca and the I-11 Interstate: For several years' discussion have been taking place in the Western states concerning an interstate route that may mimic the California Interstate-5 corridor. I-11 continuing from Tucson, Phoenix, Las Vegas, Reno, though, Oregon, Washington to Canada.

The national highway interstate system has done a good job having developed the East-West freeway systems. The Western states East of California are lacking in a good north, south corridors to serve and expand its transportation commerce.

When we talk about the **future of nuclear power** we must also talk about the Yucca Mountain Repository. The Yucca build, would be a tremendous asset to the advancement of the I-11 interstate corridor. Other considerations are the locations of several **Western National Research Laboratories**, **Sandia** in New Mexico, **Lawrence Livermore**, California, **Pacific Northwest**, Richland Washington, **Idaho National Lab**. Idaho Falls, ID.

As we advance the commercialization of nuclear power technology cooperation between these laboratories and the commerce business sector will grow exponentially as research, test equipment, and the products and services for carbon free nuclear power rebuilds. Weather we accept this now or later, the assets of Yucca destined "spent nuclear fuels" will be recycled into clean new energy for the continued growing demand for electric power in the future.



The following is one of our informational bullet lists which provides facts about the Yucca Mountain study during drilling of the original main tunnel of Yucca Mountain. Items like this will be included in our print-survey information sent to thousands of Nevada households for educational outreach. Nevada citizens have never been provided sufficient information about the scientific study in order for them to make their own common sense conclusions about the safety and sustainability of the Yucca Mountain program.

Nuclear Facts, the Science, Not Politics Yucca Mountain Repository

- A thirty + year study by of Americas National Scientific Laboratories.
- Input and review recommendations from more than 100 US colleges and universities.
- A taxpayer investment into the research study of more than \$10 Billion.
- A future reprocessing economic potential of 14 trillion dollars.
- Reviewed by more than 200 scientists and engineers at the NRC with no disqualifying elements found.
- DOE provide 97 million dollars to the State of Nevada to “parallel study” the data collection (science).
- Nevada is claiming 200 “contentions” in their opposition study, these, are expected to be overruled by the adjudication process by the NRC Atomic Safety & Licensing Board.
- In general Nevada’s opposition contentions were contracted through China, Japan, UK why not U.S?
- 9 of Nevada’s 17 Counties support completing the Yucca Application Review Process.
- 26 national groups and associations have written position statements supporting Yucca MT.
- Advanced reactor designs will be capable of burning the current nuclear waste.
- Designed with robotic placement & retrieval, drone surveillance 24/7 365.
- The science data study behind “Yucca Mountain is safe beyond a reasonable doubt”. We can debate whether or not science can accomplish this but you cannot debate the fact, in the past 30 years’ science has produced digital television, hand-held cell phones with Internet video, TV access etc. Nuclear power has made similar advances but government and the industry has not promoted these advancements through grassroots public outreach.

US Nuclear Energy Foundation
“The loudest VOICE for nuclear advocacy in recent years”

It is important that our foundation, and its mission be vetted on the commitment and engagement of our Advisory Board:

Gary J. Duarte
Director, US Nuclear Energy Foundation
comments@usnuclearenergy.org
775 224-2089

AREAS OF SPECIALIZATION (A layman with a mission). I grew up in Maine playing ice hockey about 12 years in the Contractors League. I played music with several local bands, The Fascinations, my band The Liverpool Gas Company played the PAL Hop Days at Lewiston City Hall, opened shows for Dave Clark Five, Young rascals, Cyrkle. I lived in Maine about 38 years and moved to Nevada in 1984. I saw the Maine Yankee Nuclear Power plant go online in 1972 and it produced electrical energy through 1997 a 25-year successful operating history.



My knowledge of nuclear energy is that of an average citizen, I am not a scientist or an engineer. An entrepreneurial background began at the age of about seven or eight talking an employee of a lumber company into building me a rock maple shoe shine box for a percentage of my earnings, he did, I did, I paid, I still have it! I served as Executive Vice President of the Maine Jaycees, organized the first statewide multi-chapter March of Dimes Walk-A-Thon. I started and operated Duarte Typesetting Company for 17 years, the first computerized book phototypesetting company in the State of Maine. We developed a software application Stylo-Type I, the first "Mac" based mnemonic coding program to link a Macintosh computer to a Linotronic typesetting machine. I Co-Authored a paper "The SGML Solution to System Independence" by Gary J. Duarte, President, DeskTop ComPosition Systems, Inc. & J. Sperling Martin, Vice President, Aspen Systems Corp. 1990. SGML (standard generalized markup language) was a text based mnemonic markup code, a predecessor and included as part of HTML (hypertext markup language) now used in WEB document processing. As an industry specialist I taught the Introduction to Printing & Graphics at Truckee Meadows Community College several years, Reno Nevada and worked several years in the casino entertainment realm on stage work and as an audio video technician. Founding the US Nuclear Energy Foundation when retiring in 2006 has been an obsession. A grassroots directive to educate America about the truth of nuclear technology and the development of nuclear waste management and reprocessing.

Dr. Alan Waltar

Retired, Senior Advisor as Director of Nuclear Energy
Pacific Northwest National Laboratory
Professor and Head of Nuclear Engineering at Texas A&M University
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Dr. Alan Waltar: He was the keynote speaker at our USNEF presentation during the American Nuclear Society meeting in Reno, 2006. Dr. Waltar is a retired Senior Advisor and Director of Nuclear Energy to the Pacific Northwest National Laboratory (PNNL), Richland, Washington. He was also Professor and Head of Nuclear Engineering at Texas A&M University, where he helped to build that program into the largest Department of Nuclear Engineering in the nation. Dr. Waltar is a Fellow and Past President of the American Nuclear Society. He is also author of the book "Radiation and Modern Life" - Fulfilling Marie Curie's Dream" and "America the Powerless" as well as co-author of two textbooks on fast reactors. He serves as well as a consultant to the IAEA and the U.S. Department of Energy. Dr. Waltar was instrumental in the formation of the World Nuclear University Summer Institute (SI) and has served as a mentor and a member of the faculty for all eleven of the institutes.



Bruce Marlow

Vice President, AREVA, (retired 2014)

A 41 year veteran of AREVA

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530 264-6064

Bruce Marlow, Bruce has been supporting the successful operations of the Nuclear Power Industry by driving Innovation and training along with leading large integrated projects. Currently, Bruce is working on Clean Water, Geothermal and Energy Storage projects that are keeping him running on a very busy pace. While at AREVA, Bruce was the Integrated Site Manager leading the AREVA Team working to return the San Onofre Nuclear Generating Station (SONGS) back to service until its unfortunate close decision. Before becoming a Vice President, Mr. Marlow served as the General Manger of Conam/Rockridge, an AREVA legacy company where he was responsible for all Business Development, Project Execution and Technology Advancement. He developed Conam from a \$2.5 million company in 1980 into a \$40 million organization in 7 years. In 1997, Conam generated 70% of the operating income of AREVA North America. Mr. Marlow has worked at every Pressurizer Water Reactor (PWR) in the US and several in Japan and Europe.



John Shanahan

President, [Go Nuclear](http://GoNuclear.org)

President, Environmentalists for Nuclear Energy - USA

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303 399 0393

John Shanahan, President, Go Nuclear, a Civil Engineer. Over 30 years' experience with design, research and licensing for commercial nuclear power plants in the USA and Switzerland. Advocate for global public education about widely useful forms of nuclear power, science, technology, medicine, and low-dose radiation. Go Nuclear, Inc. is a non-profit organization based in Denver, Colorado, USA. We work with professionals in nuclear energy, nuclear medicine, and low-dose radiation around the world. We also work with advocates outside these fields from students up to retired professionals in other fields. John is also President of Environmentalists for Nuclear Energy - USA, EFN-USA, is a non-profit organization based in Denver, CO. It affiliated with and align our values and mission with Environmentalists for Nuclear Energy, EFN, in Houilles, France, Bruno Comby is Founder and President.

Dennis Moltz, PhD

B.S. Chemistry, B. S. Mathematics, Texas A&M University (1974)
Ph.D., Nuclear Chemistry, University of California, Berkeley (1979)
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Dennis Moltz, PhD: Dennis is Co-Coordinator for our USNEF Northern Nevada Chapter. His background is a B. S. Chemistry, B. S. Mathematics, Texas A&M University Ph.D., Nuclear Chemistry, University of California, Berkeley Dennis owns, **High Desert Nuclear Technologies LLC**, Carson City, NV Dennis does contract work for Radiation Detector (all energies of photons and particles), Ion source technologies, isotope separations, chemistry of radioisotopes, Nuclear Waste Issues, Low Level Background Counting, Fabrication for Any Nuclear Experiment, Special Nuclear Electronics Designs. Dennis has experience with most accelerators in North America.

Arvid Pasto

PhD Ceramics, State University of New York
arvidpasto@yahoo.com

AREAS OF SPECIALIZATION: Arvid Pasto spent his entire 39-year career working in the field of materials for energy applications. He retired in 2007 as Director of, High Temperature Materials Laboratory (HTML), and Manager of EERE and Technology Programs, Metals and Ceramics Division at, Oak Ridge National Laboratory (ORNL). In the latter capacity he directed the operations of the HTML, a national "user facility", and he managed the applied energy technology programs of the Division.



Experience includes eleven years at the corporate R&D center of GTE in Waltham, MA, and eight years prior to that in the Metals and Ceramics Division of ORNL. During his time at ORNL he became, in the 1970's, one of the world's most knowledgeable individuals on europium oxide, a potential to replace boron carbide as the control rod material for fast nuclear reactors. He conducted in-reactor radiation tests of europium oxide at the EBR-II reactor at the Idaho National Laboratory. Later, he was on the ORNL team that won an IR-100 award for their development of microsphere nuclear fuels.

His degrees are from the State University of New York, College of Ceramics at Alfred University, earning a B.S. in Ceramic Science in 1967, an M.S. in Ceramics in 1969, and a Ph.D. in Ceramics in 1972. Arvid is a Fellow of the American Ceramic Society, and has served on numerous professional boards and committees, including the Virginia Tech MSE Department Advisory Board. He was also Vice-President of the United States Advanced Ceramics Association (USACA).



Dr. Bruce P. Johnson
Professor Electrical Engineering
University of Nevada Reno
Reno, Nevada
johnson@ee.unr.edu

AREAS OF SPECIALIZATION:

Dr. Johnson's area is high frequency electronics and electromagnetic compatibility. He is trained as a Physicist including courses in nuclear and health physics. Current research interests include solar and piezoelectric energy generation and high frequency instrumentation.



Peter G. Shaw
Radiological Controls Engineer, Naval Reactor Facility, at
Idaho National Laboratory, Retired
Idaho Falls, ID. 83415-3710
johnson@ee.unr.edu

AREAS OF SPECIALIZATION:

Radiological controls in the handling and packaging of spent nuclear fuel and nuclear waste. Analysis of radiological waste and waste residues, In Situ treatment of buried radioactive-TRU and LLW hazardous buried and underground tank waste, liquids, ashes, salts, sludge's, debris, contaminated soils Development of treatment criteria for both effectiveness and implementability. Preparation, review implementation of technical work documents for handling, treatment and disposal of the full spectrum of radiological materials.



Eric Jelinski M. Eng. P. Eng.
Senior Consultant for a major nuclear energy company (2014- present)
Teaching nuclear engineering at University of Toronto and at
University of Ontario Institute of Technology (2014)
eric_jelinski@sympatico.ca

AREAS OF SPECIALIZATION:

Supervising student 4th year Capstone Course Projects at University of Toronto (2011- present)
Project Manager for Engineering Strategies and Practice course at Univ. of Toronto (2011 – present)
Teaching aerodynamics, math & engineering and nuclear engineering at Georgian College (2008 – 2012)
On Georgian College Advisory Committee for implementation of a Power Engineering Program and set up a nuclear engineering course (2008-2010)
31 years at OPG – Nuclear (retired in 2007)
Positions included, engineering, maintenance and operations / Major Components Lifecycle, SG's, HX, Pumps, Piping / Tooling design life extension and refurbishment / Contracts Manager and Shift Outage Manager / 20 years in electric vehicles, teaching, design & consulting (1990-2010) / Papers for SAE and NESEA / EV Course at Durham College.



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Retired DOE, Independent Consultant
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(301) 514-0217

AREAS OF SPECIALIZATION

Mr. Letourneau has 30-years' experience in both public and private environmental management and nuclear issues. Mr. Letourneau has a Master's Degree in energy and environmental public policy from the Kennedy School of Government at Harvard University. During his career, Mr. Letourneau has been an environmental consultant, Vice President of Jason Associates, which wrote the environmental impact statement for Yucca Mountain, a member of the NCRP waste board, and consultant to the IAEA on shallow land burial of LLW. While with the Department of Energy, Mr. Letourneau was project manager for the development and implementation of DOE's radioactive waste management directive (DOE Order 435.1); involved in the preparation of determinations allowing the Department to dispose of residual HLW at the Idaho National Laboratory, West Valley Site, Savannah River Site, and Hanford Site; and was instrumental in developing, deploying, and leading the public and stakeholder involvement process used to reach consensus in the tank closure projects.

Michael W. R. LaFontaine
Consulting Physicist, PhD
physics@execulink.com
AREAS OF SPECIALIZATION

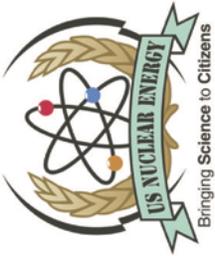


Consulting Physicist: Instructor for nuclear engineers and physicists re. in-core reactor radiation detection principles and system design for China Nuclear Power Research Institute, Shenzhen, China (2012-2013). Quarterly Reactor Physics School instructor for post-grads regarding reactor radiation detection systems at Atomic Energy of Canada Ltd.'s Chalk River Laboratories (2011 - present). Contract Physicist for Mitsubishi Heavy Industries, US-APWR projects (2010 - 2013). Contract Physicist & Radiation Safety Officer for Mirion Technologies (IST Canada) Inc. (2010 - present). Extensive experience measuring and monitoring radiation. Specializing in research, design and development of radiation detectors, radiation monitoring, and Class 1E reactor control systems for a variety of applications; also preparation and presentation of radiation monitoring and radiation training programs and instruction.

Bill Stremmel
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AREAS OF SPECIALIZATION



I appreciated the role of nuclear energy growing up in the Chicago area where Commonwealth Edison achieved over 50% of its generation from reactors by the 1970's. Graduated from Indiana University in 1976 with degree in Transportation & Public Utilities Management. Experience in private sector ranged from work in an industrial traffic department to North American agency operations for global cargo carriers. My twin vocational aptitudes of Analysis and Accounting are now employed with CyberTran, developing an automated Ultra-Light Rail Transit (ULRT) system. Civic involvement includes 12 years on advisory committee to Alameda County CA Transportation Authority and now membership of Pahrump, Nevada's Nuclear Waste & Environment Advisory Committee. I jumped into the fray over Yucca Mountain when a National Monument was designated as an underhanded ploy to block rail access into the repository.



US Nuclear Energy Foundation Organization Chart

Primary Management Team

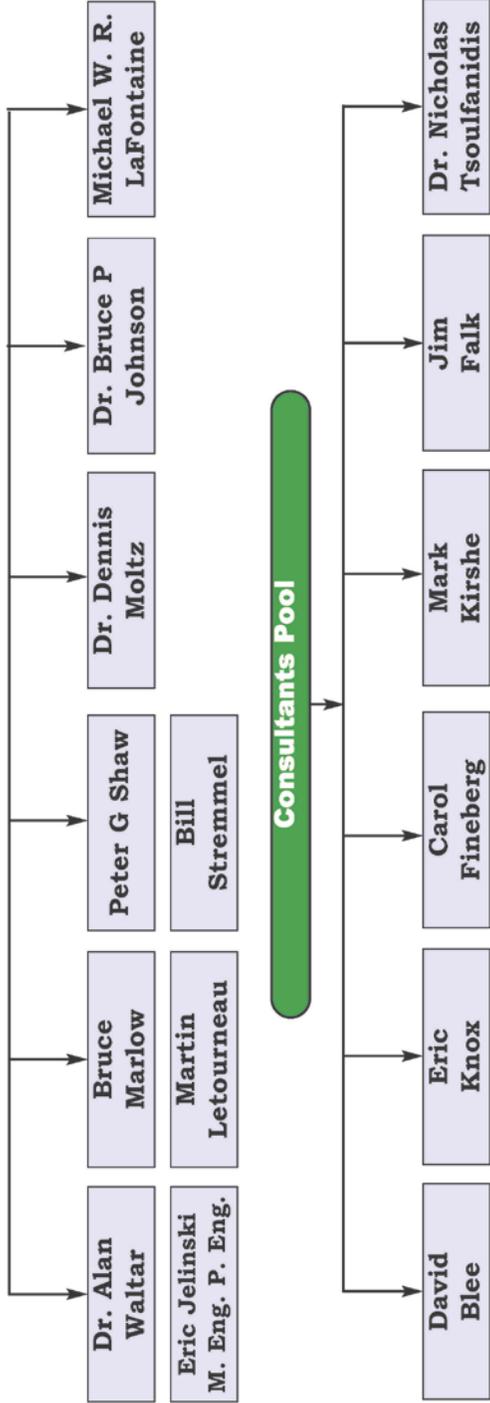


Gary J Duarte
Director



Bruce Marlow
Senior Advisor

USNEF Advisory Board, Industry Experts



Educational Outreach Media Campaigns are in development, consulting with TV stations.

We are working on developing the media program with several people, Tamira L. James, Account Executive KTVN Channel 2 News, Chip Cooper, Lotus Radio Corp, Joe Francis, Cumulus Media Inc., Gregg Siegel, NBC Vegas, Michael Korr, Fox5, Vegas. As we advance our program we will establish similar contacts with the Las Vegas media market.

	A	B	C	D	E	F
1						
2	JUN through NOV 2018	24 Weeks				
3	Media Budget					
4	PROJECT	Date	Time	RATE	Number	
5	Yucca Educational Outreach Campaign		Segment		of Spots	
6						
7	TV Stations / Reno, Northern NV					
8	KTVN CBS Channel-2	6/30/2018	6-7 AM news	175.00	40	\$7,000.00
9	KOLO ABC Channel-8	6/30/2018	11-1 Noon News	175.00	40	\$7,000.00
10	KRNV NBC Channel-4	6/30/2018	5-7 Eve News	175.00	40	\$7,000.00
11	KRXI FOX Channel-11 Reno			175.00	40	\$7,000.00
12						
13	KTVN CBS Channel-2	7/31/2018		175.00	40	\$7,000.00
14	KOLO ABC Channel-8	7/31/2018		175.00	40	\$7,000.00
15	KRNV NBC Channel-4	7/31/2018		175.00	40	\$7,000.00
16	KRXI FOX Channel-11 Reno			175.00	40	\$7,000.00
17						
18	KTVN CBS Channel-2	8/31/2018		175.00	40	\$7,000.00
19	KOLO ABC Channel-8	8/31/2018		175.00	40	\$7,000.00
20	KRNV NBC Channel-4	8/31/2018		175.00	40	\$7,000.00
21	KRXI FOX Channel-11 Reno			175.00	40	\$7,000.00
22						
23	KTVN CBS Channel-2	9/30/2018	5-7 Eve News	175.00	40	\$7,000.00
24	KOLO ABC Channel-8	9/30/2018		175.00	40	\$7,000.00
25	KRNV NBC Channel-4	9/30/2018		175.00	40	\$7,000.00
26	KRXI FOX Channel-11 Reno			175.00	40	\$7,000.00
27						
28	KTVN CBS Channel-2	10/31/2018		175.00	40	\$7,000.00
29	KOLO ABC Channel-8	10/31/2018		175.00	40	\$7,000.00
30	KRNV NBC Channel-4	10/31/2018		175.00	40	\$7,000.00
31	KRXI FOX Channel-11 Reno			175.00	40	\$7,000.00
32						
33	KTVN CBS Channel-2	11/30/2018		175.00	40	\$7,000.00
34	KOLO ABC Channel-8	11/30/2018		175.00	40	\$7,000.00
35	KRNV NBC Channel-4	11/30/2018		175.00	40	\$7,000.00
36	KRXI FOX Channel-11 Reno			175.00	40	\$7,000.00
37			Total	Spots	960	
38						
39	Reno Northern Nevada subtotal TV'					\$168,000.00
40						
41	<i>The spot runs below reflect 80 per month for the 6-month ad program</i>					
42	TV Stations / Las Vegas, Southern NV					
43	KSNV-NBC Channel-3		6-7 AM news	375.00	480	\$180,000.00
44	KLAS-CBS Channel-8	6/30/2018	11-1 Noon News	375.00	480	\$180,000.00

45	KTNV-ABC Channel-13	6/30/2018	5-7 Eve News	375.00	480	\$180,000.00
46	KVVU-Fox5 Channel-5			375.00	480	\$180,000.00
47	Vegas Rates estimated at twice the Reno rates & number of spots		Total Vegas	Spots	1920	
48						
49	Las Vegas TV Spots Southern NV			Total		\$720,000.00
50						

	A	B	C	D	E	F
52	RADIO Average \$70.00-30 Sec Primetime					
53	KUNR 88.7 FM / Public radio			70.00	50	\$3,500.00
54	KBUL 98.1 FM / Country			70.00	50	\$3,500.00
55	KOZZ 105.7 FM / Classic Rock			70.00	50	\$3,500.00
56	KDOT 104.5 / FM / Rock / Chip Cooper			70.00	50	\$3,500.00
57	KKOH 780 AM / News Talk			70.00	50	\$3,500.00
58	KUUB 94.5 FM/ Sports/ Chip Cooper			70.00	50	\$3,500.00
59						
60				Subtotal		\$21,000.00
61						
62	Social Media / Recommend 35%		of 370k = 130.00			
63	Live interview PodCast Shows - per-mo / 6-Mo					\$15,000.00
64	YouTube Advertising /setup					\$1,000.00
65	Facebook Advertising / \$500 per wk 24 wks					\$12,000.00
66	Google Adwords Advertising-\$2500 / mo-6					\$12,000.00
67	Twitter Advertising					\$12,000.00
68						
69				Subtotal		\$52,000.00
70						
71	Direct Mail Printing Surveys & Education					
72	3-160k mailings printing & prep 500,000 Tot.					\$603,000.00
73	TV, Radio Production costs, operational costs					\$300,000.00
74						
75	TV spots, Direct mail, Social media, production & operating costs			TOTAL		\$1,916,000.00
76						
77						
78	This educational campaign is planned to run over 6 months. Each of the 3-160,000 direct mailings will address educational information including survey questions to Nevada households. The network TV ads will supplement the mailing program to reinforce the direct mail campaign. At the outset the public will be encouraged to "inform" their elected representatives that "they" support completion of the Yucca Mountain Application Review Process. The entire campaign is a grassroots Yucca Mountain educational outreach program.					
79						
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84						

This educational campaign is planned to run over a 6-month period. Each of the 3-160,000 direct mailings will address educational information including survey questions to the households. The network TV ads will supplement the mailing program to reinforce the direct mail campaign. At the outset the public will be encouraged to "inform" the representatives that "they" support completion of the Yucca Mountain Application Review Process. This is a grassroots educational campaign.

From a U.S. citizen point of view, Yucca Mountain fulfills the formula of logic, common sense and deductive reasoning. Yucca Mountain is very remote. It is on Federal land reserved and intended for service to the country. It is on land utilized for years for the nation's "important" atomic testing. Atomic weapons, nuclear power, radar, medical radiation therapy, all of these programs have been conducted to secure and maintain the safety, security and freedom of the American People. There is always opposition, but understanding comes from common sense, through apolitical grassroots education.

GRANT REQUEST:

The US Nuclear Energy Foundation is requesting that this Grant Application be funded by the **Nuclear Waste Fund** at the **U.S. Department of the Treasury** by the **Congressional Appropriations Process**. It is a direct application of educational information as Public Outreach specifically concerning the Yucca Mountain Project which has been a contentious issue for the Nuclear Waste Fund. The intent and success of the Nuclear Waste Fund has an important need for a **Public Outreach program** to improve the public perception of the Yucca Mountain Project (and new nuclear technology) which is primary to completion of the Yucca Application Review Process.

Gary J. Duarte, Director,



US Nuclear Energy Foundation