ABBY JOHNSON'S

INTERVIEW WITH MICHON MACKEDON

EUREKA COUNTY, NEVADA

YUCCA MOUNTAIN LESSONS LEARNED PROJECT

held in

FALLON, NEVADA

May 16, 2011

MS. CLANCY: The tape is rolling. This is Gwendolyn Clancy talking from behind the camera. I'll be doing the videography for the interview we're doing today. It is May 16, 2011. We're in Fallon, Nevada and Abby Johnson will be doing the interview.

MS. JOHNSON: My name is Abby Johnson. I'm the Nuclear Waste Advisor for Eureka County, Nevada. This is the Eureka County Lessons Learned video project, and today we're interviewing Michon Mackedon. Michon is Professor Emeritus of the Western Nevada College. And, she is the author of the increasingly famous book "Bombast."

Michon, I want to ask you first about your background, how did you come to be in Nevada and what is your experience with nuclear testing?

MS. MACKEDON: Well, I came to be in Nevada because I was born here. I was actually born in Reno, but my parents were living in Fallon at the time, so I'm as close to a Fallon native and to a Nevada native as you can get.

I did have some early experiences with atomic testing, but they were like recovered memory syndrome. I didn't really remember what I remembered until after I started doing my research. And, then, I kind of turned back my mental clock and I thought I remember 1951, I was a very small child and my father had helped pave roads. He was the head of the construction company, and Fallon had helped pave

the roads into the Nevada Test Site, and very much an advocate of atomic testing, and he used to get--there were four kids in the family, actually three and the fourth came in '52, but that's another story. He used to get us up at the crack of dawn on a day of a "shot," make the orange juice, make the pancakes, and we'd sit in front of this bay window in Fallon and watch what I call in the book the Southern Sunrise. And, I do remember just the phenomena, the spectacle. I don't remember much else except that we would go to school, grammar school throughout the Fifties, and everybody would talk about the test at Las Vegas that morning. So, I witnessed, over a distance of some 300 miles, oh, at least five or six of those tests. I can't remember exactly, but we could see them very well from Fallon, Nevada.

Then, the next step I guess of my relationship with atomic testing came again as sort of not really recovered memory, but almost in a backwards time frame. I got a call in 1985 from Governor Bryan's office in Carson City. And, I vaguely--well, I shouldn't say vaguely knew Governor Bryan, I knew him casually and socially because we had all gone to the University of Nevada during the late Fifties and early Sixties, my husband included, and he'd been a fraternity brother of the Governor's, and so we have mutual friends. And, I knew him to some degree. And, I got this phone call, I remember it was about 8:00 in the morning, and the voice on

the other end said, "This is Governor Bryan's office, and he would very much like for you to serve on the New Nevada Commission on Nuclear Projects." And, I was astounded.

I had no knowledge of what was going on with the Yucca Mountain Project, which was the impetus for forming this commission, and quite surprised that I would be chosen to be a member at this commission. Well, as it turned out, it was a lay commission, formed of people who really didn't have a lot of specific knowledge about Yucca Mountain, so I did my homework. I started reading everything I could, and that reading took me back in time, again to Nevada's testing in the Fifties, and to what some people know about and some people don't know about, and that is an underground test that was done in Fallon, Nevada in 1963. That was called Project Shoal. It took place on my very doorstep, and I found myself questioning why I didn't carry through a memory or an idea of how the people in my community had reacted to that test.

So, this became an academic pursuit as well as a public service pursuit. I was on the commission. I started taking notes on what I heard from, say, the Department of Energy trying to sell the project in Nevada, and that led me to question, well, in the early years, were those same techniques used? And, the answer is yes.

MS. JOHNSON: And, that's part of the basis for your book, isn't it?

MS. MACKEDON: It is. You know, I think my first response when I sat in the early years, and I was on the commission for 22 years, those first few years, a real learning curve, but also I started taking notes on why Nevada, why does Nevada become the "it" for so much atomic hanky panky, and I started discovering some answers to that. And, the answers really lay in my academic pursuit, and that is English and Language, and the way in which Language can be used to color a region of the world. I'm not just talking about Nevada, but how Language can be used to designate a site, an atomic site, a prison site, a water waste site as suitable, as the perfect place on earth for this kind of experiment. So, I started listen to how Nevada had become the perfect place for atomic testing, and later, you know, suitable for Yucca Mountain. So, I began to isolate, you know, what was being said to me.

MS. JOHNSON: Can you give us some examples?

MS. MACKEDON: Yes, I can. And, the one that is so obvious I think to people who studied the issue at all is that Nevada is a wasteland. And, that one really intrigued me because I love my state, and I don't consider it a wasteland. And, yet over and over and over again, you look at newspaper articles, especially those published in the East, and Nevada is colored in Language as ugly, barren, full of crows, and rattlesnakes. You don't hear about the Kern

Illian Mountains and the lush sage. You hear the underside of the environment, and that was a very common approach to Eastern journalism during the early years of Nevada testing. And, as you know, it's a common trope now that's used to sell Yucca Mountain in Nevada.

The other one is sound science. We are going to guarantee that your state is safe because we will only implement sound science. And this one really intrigued me intellectually as well, because I started asking okay, what is sound science, if you can get, say, the State of Nevada to study Yucca Mountain, and come up with statistics that would say that the site is not suitable, but on the other hand, have somebody like the Department of Energy study it and say well, all of the data points to sound science, then there's obviously a problem rhetorically with the term "sound science." How can it mean two opposite things at the same time, so I started studying how often the phrase "sound science" had been used to try to sell projects in Nevada. And, of course, discovered that it was a fairly common propaganda technique. Radiation is natural. My favorite.

MS. JOHNSON: Another one is safe.

MS. MACKEDON: Safe, yes.

MS. JOHNSON: What is safe?

MS. MACKEDON: What is safe, and what does safe mean? And, then, this pursuit also led me to look at how the

United States is not really along in terms of the ways in which agencies try to produce truths about environment. You know, and I think it needs more study than "Bombast" but I do think it's an idea, that it certainly intrigued me, and I certainly found evidence that that was the case. That we have been colored by Language to appear safe, suitable, wastelandish, radiation is natural, so nobody is going to get hurt, and the other, I isolate about six of those tropes in the book.

MS. JOHNSON: Let's move on to the next question.

MS. MACKEDON: Okay.

MS. JOHNSON: Michon, the title of your book is "Bombast." Can you explain that, please?

MS. MACKEDON: Well, I will say that it wasn't the original title of the book, that anybody who has ever written a book realizes that a book goes through several stages or metamorphosis, or whatever we want to call it. But, when I first started doing the manuscript, and I knew I was going to be talking about Language, I called it "Speaking Atomic," and everybody just groaned. It was like, "Oh, God, that just sounds so old. It just sounds like something that's already been written. It's not catchy enough."

So, then, I got a really clever idea, and I said okay, I'm going to name this book "Adam, A-d-a-m, meets Atom, A-t-o-m," because we, Nevadans, are the Adams in our

paradise. We are the innocents, and we have been bamboozled by the purveyors of Atoms. So, I thought "Adam meets Atom" and then I have a lot of comments on how we name bombs in here, and I thought Adam named the earth, so I thought it was just a great title. And, the publishers and the readers just really groaned over that one.

So, I have a friend in Fallon who is a poet and he said, "Well, the title of the book is obvious." You know, it's "Bombast." You're talking about bombs and about the kind of overflown, inflated language that we use with the term "Bombast." And, he said, "The two come together as a great pun for the book." So, Bombast, it was.

And, I'll tell you a little story because the book was actually printed in China, the publishers of Reno, the Blackrock Institute Press, but the actual physical printing of the book was done in China. So, this book had to come over in crates from China to San Francisco. And, so, here are these crates in our era of terrorism, landing on the shore in Oakland to be off-loaded, and they're marked "Bombast, spinning atoms in the desert." So, the terrorism crews really, you know, perked up over that, and all of these books were quarantined and pulled off the dock, every single one of them x-rayed because I guess they're following their orders. And, my publishers were hysterical because they said, "Hey, look, if you really want to do mischief, you're

not going to stamp Bombast on the crates, spinning atoms on the desert if you're really bringing in bombs and atoms." So, anyway, that was kind of a stealth maneuver on the book, but it made it and here it is.

MS. JOHNSON: Let's move on to the next question. Michon, what conclusion did you come to from your years of experience on the Commission on Nuclear Projects in your State service for the State of Nevada?

MS. MACKEDON: Okay, well, you know, there are like tiers of conclusions that I would say that I arrived at, some of them having to do specifically with the information that was given to me as a member of the commission, and others, as this kind of growing awareness about America and the bomb. And, so, you know, the first set of conclusions were just intellectual academic conclusions about how dangerous nuclear experimentation is. I mean, this is a test that was done in 1954, and it's so obvious the power of these bombs, and here they were, this one was done in the Marshal Islands, but here they were done on my State soil, and with a lot of cover-up, a lot of what I call coguhistory in the book, just sort of mumbo jumble about whether it's dangerous or not dangerous.

And, so, one of my conclusions, not necessarily from studying Yucca Mountain, but from the journey that I took studying atomic testing, and nuclear events in general, one of the conclusions is that this is a long-lived legacy.

We are left with residue from our atomic testing in Nevada, underground as well as above ground. We're left with a legacy of health problems that we still don't really have a good handle on. We have radiation physics and radiation health physics and we pretty much understand what kinds of radiation cause what kinds of cancer. But, there are a lot of mysterious cancers and mysterious illnesses that we can't really trace directly to our above ground testing or our below ground testing. So, this creates a climate, and this is a conclusion is that we have created a climate of mistrust, that then spins over to what I discussed at the end of "Bombast," and that is one of the conclusions, not that I've drawn, but that has been drawn now with the Blue Ribbon Commission that has studied the Yucca Mountain Project in Nevada, the conclusion is that there's so much mistrust from the way in which atomic events have been handled, that we have to revisit this issue completely.

It almost skirts over whether Yucca Mountain is safe or not safe, the Blue Ribbon Commission is, in saying it doesn't matter. We have a bad political climate for trying to convince Nevadans to accept Yucca Mountain.

Conclusion number three, even if we didn't have a bad political climate, Yucca Mountain is a bad idea. And, that is a solid conclusion that I've made from several points of view. One of them is kind of a philosophical point of

view, and that is that we're dealing with substances that are extremely long-lived. I mean, plutonium has a half-life of 24,500 years. Should we bury it at Yucca Mountain or some other place, it remains viable and lethal for over 100,000 years. Some studies have said that the peak dose from Yucca Mountain into the groundwater surrounding that mountain would be in 250,000 years. Now, that is time that one can't even fathom, let alone called sound science or say that it can be safe for that period of time. So, I'm against geologic repositories.

And, then, I think the transportation issue for Nevada has been exacerbated by the plans to put the waste in Yucca Mountain, because we are probably the furthest place on earth from where the waste is generated. It's generated primarily on the East Coast. And, so, what you do with it, if you're going to put it on wheels, has to come across the Heartland of America. And, because of what I just said, the long-lived lethal radionuclides, I don't think it's a good idea to transport the waste anywhere. So, I think we have to go back to the drawing board. My conclusion: we haven't reached a solution to dealing with high-level nuclear waste. We've barely, I guess to coin a phrased, scratched the surface of Yucca Mountain, and we've discovered that there's no such thing as a safe place when you look at mountains. They have problems.

So, one of the ideas the Department of Energy had after they started studying Yucca Mountain was well, the mountain itself is porous and is kind of fractured, so, we'll develop another plan, rather than say that Yucca Mountain is good host rock, we'll simply engineer a repository.

And, I started turning that idea this way and that way, and I thought well, if you can engineer, if you really can engineer, which I don't think you really can engineer something that lasts 250,000 years, but assuming you could, then the question of why Yucca Mountain becomes even more urgent, because the transportation to Yucca Mountain becomes a more burning issue. If you can engineer a repository, put it in Vermont, put it in Massachusetts, put it in New York, put it where the power is generated, South Carolina.

And, yet, those ideas are politically unfeasible at this, you know, juncture because Yucca Mountain, there's been so much money put into it and so much effort, to say this is the safe place to store high-level nuclear waste. So, my conclusion is no safe place.

MS. JOHNSON: Let's move onto the next question.

MS. MACKEDON: I've talked a little bit about the legacy of mistrust and some of the problems with the way in which nuclear testing was handled in Nevada. And, I have to be careful to say that I don't judge whether we should or should not have done atomic testing in Nevada. We were in a

war with Korea. We were in an increasingly cold war with the Soviet Union. I really believe that people have to live their moment and judge their moment within their own context. So, I hope that I haven't judged atomic testing. But, what I do judge is the way in which it was handled in Nevada, the deceit and the lies and the denial that people in the State experienced.

So, here's what I wrote about one of the legacy effects, of living next to the test site, and the way it was handled by the government, by our own actually, our own Congressional delegation and by the press.

"In Nevada, questions about the dangers of nuclear fallout increased in numbers and intensity, following the death of a Central Nevada child, Butch Bordolli, in 1956. On a Nevada topographical map, the Bordolli Ranch is nestled in a hollow, where the Quinn Canyon Range meets the Grant Range to the east of Railroad Valley in Nye County. The ranch home is situated about 80 miles from Yucca Flat, where a majority, 86 of the 100 total, of Nevada's atmospheric tests were conducted. Martha and Alfred Bordolli were in many ways typical of people living near the Test Site, not misfits or bewildering desert dwellers, as featured in the stories of the press."

And, this is a reference to one of the thesises in my book, and that is that not only was the landscape created

by language, but the people that lived in Nevada were kind of created as quirky and maybe a little bit intellectually challenged, so as to make the site seem more suitable.

So, here I'm saying, "Martha and Alfred Bordolli were really the typical Nevadans. They were productive ranchers engaged in raising hay, grazing livestock, and enjoying their wide open spaces and growing families. During the 1950's, they were almost always hard at work before daybreak, aware that the pre-dawn sky to the south periodically turned brilliant colors, then darkened as black clouds blew toward them."

Martha Bordolli felt uneasy about atomic testing from the beginning, "Our cows got white spots on them and cancerized. At school, children broke out with rashes from the radiation. In 1955, seven year old Martin, Butch, Bordolli came home from school one day with a fever and feeling unusually fatigued. He was diagnosed with stem cell leukemia, almost certainly, believed his parents and neighbors, a result of exposure to radiation from atomic fallout. He died shortly afterward. In 1957, his mother circulated a petition signed by 75 neighboring ranchers and business people asking the Atomic Energy Commission to halt atmospheric testing in Nevada. The petition was forwarded to Washington, D.C. to the Joint Committee on Atomic Energy."

Now, the response that Martha Bordolli received, I

go into at some length. First of all, there was another booklet produced that was really an effort to assuage Nevadans of any fears of radiation. But, she also specifically received some official responses to her petition from specific individuals in Washington.

A letter from Louis Strauss, Chairman of the AEC, dismissed any connection between leukemia and fallout, referring to "experts." And, with chiding words, Strauss made the link between accepting nuclear testing and keeping our nation safe and free. "The government decisions regarding nuclear testing have not been made lightly," he told Mrs. Bordolli. "The possible risk from continued weapons testing have been carefully evaluated by competent scientists."

Now, I call this in the book another one of these language ideas, another one of these language tropes, that we refer to experts, and this intimidates the general population. All we have to do if we want to press a point and intimidate an audience is say it's been vetted by experts. And, this was used over and over again in these kinds of letters to people who were objecting. But, it's particularly, I think, reprehensible to the mother of a child who has just died from leukemia.

The possible risk "from continued weapons testing have been carefully evaluated by competent scientists. The

risks of atomic testing are small, exceedingly small when compared to other risks that we routinely and willingly accept every day." And, again, we're talking about the death of a child, and to say that that's a small risk seems to dismiss a very serious and heartfelt complaint.

Quoting President Truman, Strauss continued, "Of course, we want to keep the fallout from our tests to an absolute minimum, and we are learning to do just that. But, the dangers that might occur from fallout in our tests involve a small sacrifice when compared to the infinite great evil of the use of nuclear bombs and war." So, again, this idea of reverting to patriotism was dominant certainly during the atomic testing years in 1951, but it was also used on the Yucca Mountain controversy as well. And, I have in the book a quote from a letter from I think it was the Chamber of Commerce who said that people ought to stop coming to Nevada if Nevada refused to accept testing because it was our patriotic duty to do so, and that everybody had to make a small national sacrifice. So, here we are again, it's like, you know, everything comes back full circle when we look at the language used in '51 and we look at the language used in 2003.

MS. JOHNSON: Sometimes when I'm helping to participate in a meeting, I tell them that they are the expert because they know their own place, they know where

they live, they know every blade of grass, and every turn that the wind makes, and they are the expert.

MS. MACKEDON: They are the experts, absolutely. A wonderful point. It is a grassroots issue, and, you know, I read a wonderful science writer, his name is Scott Montgomery, and he writes about the language of science. But, he calls this idea, "The insiders versus the outsiders," that when you have a political effort to try to marginalize a population, which I find has been done in Nevada on atomic issues, that one of the techniques of marginalization is to use the language of the insider, and to, therefore, make the person in the audience the outsider. And, we certainly see that apply in all kinds of issues like this.

MS. JOHNSON: Certainly acronyms are a big part of it, and then piling on the technical language, we see Total System Performance Assessment.

MS. MACKEDON: Exactly, the jargon, yes. And, then, you know, now I think again when we just talk about legacy, we have cases like Butch Bordolli, the first leukemia diagnosed in Nevada that was related to atomic testing. But, on the heels of that, we had a lot of cases analyzed and diagnosed in Utah, starting with the sheep deaths in 1953, and then moving on to a very famous lawsuit, Irene Allen, where people with leukemia, or childhood leukemia, filed a class action suit. And, now, we have ads like this for free

cancer screenings, and anybody supposedly who was exposed to nuclear testing can get a free screening. So, it's become an accepted fact now that there's a link between cancer and atomic testing, but in these early years, it really was a case of denial, and what the insider said as opposed to what the outsiders were feeling, what their gut instinct was, that this stuff was really dangerous.

One of the books that I think is most effective in putting across this point is Carol Gallagher's "American Ground Zero" and what she did, this is a photographic survey of test site workers and others. There's some soldiers in trenches, people who actually lived in the early years with atomic fallout. And, what she does is take their portrait and talk to them about their health. And, it's a grim gallery of all kinds of cancer that we see in here, and psychological effects as well, and then it's juxtaposed to some ironic photography about I guess denial of what really went on. I mean here's a photograph of animal cages. You'll be told that animals were not tortured on the test site, but obviously they were.

MS. JOHNSON: And, you have a picture of that in your book.

MS. MACKEDON: I do. The dogs, yeah, chained into the bomb shelters and made to suffer, you know, the blast of the bomb. The rationale, of course, is that the Soviet Union

is going to do that to us, so, therefore, we have the right to do it to the dogs. It is an ethical dilemma, isn't it.

MS. JOHNSON: It certainly is. Let's move onto the next question.

Michon, as a member of the Commission on Nuclear Projects, I'm sure you went on a tour or two of Yucca Mountain. Could you tell us what your impressions were?

MS. MACKEDON: You know, I can, I have a long paragraph that I originally put into the book, and I don't think it's in there, I'm ashamed to say that I can't remember whether I left it in or took it out of the last chapter. I think it's out.

But, I went into Yucca Mountain with probably some preconceived notions about sound science and how questionable that term was to me. And, the sort of violation that I felt drilling a tunnel in a beautiful mountain like Yucca Mountain, I mean, Yucca Mountain, here's a nice black and white photo of the mountain, and I guess to unpassionate eyes, it's just another mountain. To me, it's part of Nevada. It's part of the landscape. And, when the DOE came in with this giant tunnel boring machine and they used the same kind of machine that they used to dig the English Channel, I find that really interesting, to put the channel between France and England, it's a monumental engineering project. So, that alone, sort of violated my sensibilities.

But, I put my hard hat on and I walked into Yucca Mountain.

And, my impressions were noise, noise, noise, and, so, what I wrote about that experience was that I felt that I was in a hospital ward, and that these buzzers were like MRI machines buzzing and taking the temperature of the earth, and then literally, on one wall underground in Yucca Mountain, there was this giant thermometer, because what the DOE had done is move in a prototype of what they were going to store, that is, highly lethal radioactive material, it was a mock cask, but then they were trying to guess what happens to the mountain as you raise the temperature of that lethal radioactive casks that are going to be stored in the mountain. So, you would watch as you stood there, this giant thermometer creeping up, you know, in the Kelvin scale to these really high numbers of what the heat would be like in that mountain.

And, then, these little carts would come around on rails, and these experts would come in and point out what they considered to be the fascinating engineering of Yucca Mountain. And, I just felt a sort of sadness. And, like I say, the demise seemed to me like a hospital ward.

But, I also remember there’s one other image that I remember looking at, and that is the literal so visual scars within the mountain where the fault zones run through Yucca Mountain. I mean, you can see them, and I’m not a geologist,

but you can literally stand there in that artificial cave and see the way that the earth has shifted and left it scar. Sundance Fault and Ghost Dance Fault. And, that made me sad, too, because the Ghost Dance is so much of our lost mystery of the earth.

I mean, I go back and I have a very romantic view of our Native American population, and Ghost Dancing and the connection between the sacred and the real. So, all of those images just kind of came together for me, and I felt a sacrilege. And, I felt that was strengthened by the idea that we had named this earthquake fault Ghost Dance fault, and that we knew that that mountain is unstable. The evidence is there, and yet we were going to forge ahead and tunnel that mountain and build that repository, you know, literally hell or high water.

MS. JOHNSON: Let's move on to the next question.

One of the long-standing, long-lasting questions about the safety of Yucca Mountain is for a place that would hold nuclear waste for so many, many thousands of years, what if humans discovered the nuclear waste many, many generations from now? And, so, that's known as human intrusion, and there have been a lot of different ideas about how to keep people away from the mountain.

Could you comment on the concept of human intrusion, and your thoughts on that?

MS. MACKEDON: Yes, because I think this really relates to the whole language idea that I've tried to weave throughout the book. You know, we're talking about, in a sense, trying to build a tombstone for something in a language, or marking it in a language, that will last, you know, 10,000 years is just a legislative landmark. It has nothing to do with the reality that we really must mark any site for geological burial of high-level nuclear waste to last forever. Because we can't have people stumbling into it, and inadvertently releasing radionuclides to the environment, or drilling into it and releasing radionuclides to water.

So, there have been a lot of studies and I find them again from the linguistic point of view really fascinating. For one thing, if you just go back in history and you look at the age of the pyramids and how we still haven't cracked all the mysteries of what is written and what that writing refers to in the ancient pyramids. And, you know, they are no time at all compared to what we must mark, not just a high-level nuclear waste repository, but let's say the nuclear test site with all the underground testing that's been done there, we really need to mark these places in perpetuity.

Project Shoal, outside of my home town, Fallon, it's a real issue because there are probably two kilograms of

plutonium, unexploded plutonium, underneath the soil right here in my back yard. How do we warn people that it's there.

And, I looked at ancient languages, I looked at, for example, Crete, there were two languages in ancient Crete, Minoan A and Minoan B. We can read Minoan A. We don't have a clue what the other language did. It was something that a scribe kept track of something with, and that's about as far as we can get.

So, I think we're being kind of arrogant, number one, to assume that we can design a language or a symbol or a sign that's going to outlast the dangers of the Atom, the released Atom, and yet we must do that.

So, I did look at a couple of projects. The DOE, for example, gathered together a Blue Ribbon Committee at Sandia when--so, let me explain, the Department of Energy commissioned this study, but it was a joint effort between the Department of Energy and Sandia Corporation, which is involved in nuclear studies and nuclear events. And, their quest was to determine what kinds of events would cause this social and perhaps economic disruption that would lead to a loss of language, so that we couldn't just put up a sign in English that said, "Stop, do not enter." You know, in all likelihood, in 250,000 years, this will be the case.

Then, the second part of the task was to then design a sign, some kind of a warning sign that would work

over all of these eons of time. And, I mean, the results are kind of--well, they're fascinating to read. This was really a think tank approach. But, what they told me is that there's just no way to tell what's going to happen in the future.

So, the first part of that Blue Ribbon Panel developed a series of scenarios that I found quite humorous, and I'm sure that they were being somewhat casual and humorous when they designed them. But, let me give you a flavor of some of these scenarios.

In one, the feminists take over the United States and expel men from corporate leadership in corporations, and they form what they called the Feminist Potash Company, and they start drilling, because they feel that the males have epistemologically withheld information from females. And, so, they go back in to drill all these old goldments (phonetic), let's put it simply that way. And, so, they drill into Yucca Mountain, or a repository inadvertently, and, hence, you know, release the Jennie from the bottle.

I mean, these are really kind of silly things. There's a smart mole that was developed in the imagination, and it's a robotic mole that just seeks minerals underground, and it seeks the treasure of plutonium underground, and drills into the cavity, and boom, you have radionuclides spilled into the environment. So, the first panel did that.

The second panel came in and said, okay, we can't have humans drilling or walking into this repository, or in any way breaching this repository. So, let's talk about designing the ultimate language. And, what they came up with, I mean, I really, again, I think it just defies imagination and logic. They came up with, for example, a landscape of thorns, just giant spikes, you know, set on the surface of the earth, and assumed that because we consider spikes to be kind of creepy and sci-fi, that a future generation would be.

One group designed a skull and crossbones, kind of a Jolly Roger for the nuclear waste repository, you know, hoist it up on a flag, and 250,000 years later, people will read it and say, oh, I can't go there. I mean, in a way, what this exercise highlights is absurdity, absurdity in trying to safeguard and bury something that remains that poisonous and lethal for that many years.

So, that was my experiment with researching human intrusion factors. And, then, of course it also comes out in the Environmental Impact Statement. But, what I found interesting in this document is that so little attention was given to the issues that I found most interesting, including human intrusion. And, you know, it would be cataclysmic if it occurred. Earthquakes, volcanoes, some of the certainly maybe low risk, in terms of probability scenarios, are

brushed over. But, you know, I had a scientist say this to me, that, "You can have a .000002 probability of a volcano occurring in the next 10,000 years, but if it occurs, it's 100 percent." So, statistics are part of this safe science that I question.

MS. JOHNSON: Let's move on to the next question.

To follow up on your comment about risk assessment, I think the Japanese disaster recently has shown that as we've seen at Yucca Mountain, where we have had estimates of high consequence, low probability events, which then are averaged in with other events, so that it makes it appear that the site is safer than it actually is. We saw in the Japanese situation a lot of things went wrong all at the same time.

MS. MACKEDON: Right. And, that was never factored in. I mean, who could imagine over the course of years, that you would get a tsunami and a major earthquake threatening any particular facility. But, I think that's a salient point for what we're talking about with Yucca Mountain. We cannot predict the future.

And, Yucca Mountain, too, I think highlights--so many times when I give talks about the book, one of the questions is how does the Fukushima Daiichi disaster affect the future of Yucca Mountain? I think it's a fascinating question, because I think given what you've said, it really

ought to bring caution to our planning. We really ought to be able to factor in these multiple events, and not confidently say oh, there's only a .00002 percent chance of any catastrophic event. We need to be more cautious than that. And, I think the Japanese scenario taught us that.

So, for Yucca Mountain, I think that's one direction that we should go, is a lot more caution. On the other hand, and this is a little more directly related to the politics of Yucca Mountain, but what happened at Fukushima Daiichi is that stored fuel rods next to a power plant also became heated, because they lost their cooling power. And, we have across the United States, I don't know, some--you probably know this as well as I do--but, say, 109 power plants, and they have fuel rods stored in giant swimming pools, just like we saw at Fukushima Daiichi. And, so, the urgency to get those fuel rods into a safer environment I think has been highlighted by what happened in Japan, because that water literally boiled off. They lost electricity. It could happen with some catastrophe at a power plant.

So, you know, there are solutions, and I don't think, as I've said before, the solution is to put this stuff in giant casks and move it to Yucca Mountain. I think the solution is to develop technologies and leave the waste where it's generated. And, we do have what's called dry cask storage. We can move these fuel rods out of their swimming

pools and put them into giant air cooled concrete casks. This is done, for example, in Sacramento, and they're certified safe for at least 100 years.

But, let them cool, let us cool, let us cool our heads and let science really do safe science. And, I don't mean to, I guess, bash science by questioning what safe science is. I have great faith in science. Great faith in American science to solve our dilemmas.

What I see happening is that the political drive to solve the problem has created a situation where science has not been allowed to flourish and find its natural solutions. And, I go back to the Manhattan Project in the book. I say, look, if we can create and develop and test an Atomic weapon in three years, we can certainly solve the waste problem. We can deal with transmutation. We can perhaps look at the efforts that countries like France have made toward not transmuting the waste, but reprocessing the waste. We can fine tune those and we have the science to do it. We need to pour the money into it, R&D, and we need to get the politics behind that approach, rather than this rush to bury the waste. Out of site, out of mind. And, that's been the real problem with Yucca Mountain.

MS. JOHNSON: Thank you.

MS. MACKEDON: The center of Bombast is really not my creation at all. This is a gallery of photographs

developed by my friend Peter Goin (phonetic), who is also one of the publishers of the book, part of the Blackrock Institute arena. But, his idea was to examine the art, the pop art value in our Atomic past and the images that have crept out of our legacy, good, bad or indifferent, and we came up with some great shots that really represent some of the paradoxes about Atomic testing in Nevada.

Here's one, for example, I mean, so many people claim that the bomb created havoc with their health or destroyed their families, and it's true, there are many, many incidents, as I pointed out from Carol Gallagher's book, where people were made very sick, and their lives torn apart. And, yet, the State decided to commemorate Atomic testing a few years back, and developed a license plate, and then the Atomic veterans were so upset, that people pulled it off the market. I think it's back on again.

So, here we go again. It's like is this a good thing? Do we celebrate this part of our past, or is it something that we bury and are ashamed of?

Another one of my favorite images, here's another political story that these are fat men and little boy ear rings, and, I mean, I'm not sure who would wear them, but they were developed and put into a museum in Albuquerque, and again, the outcry from people who found them to be goash and not appropriate was loud enough that they were taken off the

shelves at the gift shop.

I'm going to thumb through a couple more, because some of these I think are absolutely brilliant. The candies that came out celebrating, again appealing to childhood sensibilities, and I have mixed feelings about this, and maybe some of you would have thoughts where they were advocating if we put it on candy wrappers, or whether we're just having fun with it, I think it's a real study in semantics. What message are we projecting when we design wrappers, labels, candies, stickers? Here, we have garbage pail kits, and look at the Atom bomb coming out of his head. Semeology, the medium is the message.

Here's another one that I really like. There's squirms, radioactive, and this one, okay, right here, this was Nevada Nuclear Waste Radioactive hot sauce produced by I think it was Rusty Humphrey--yes, Rusty Humphrey, and again, it's tongue and cheek, but are we advocating, are we criticizing, are we just having fun? What's the line between pop art and serious thinking? And, I guess those are all questions to keep stirring the pot.

Another one of my favorite ideas is that during the Fifties and Sixties, because Atomic testing became such a phenomenon, look at the kinds of businesses that sprung up across America. Here's Atomic hair. Here's an Atomic speedway. Here's an Atomic laundry. And, so, I guess that

gives us a double message. One is that it really was an important phenomenon in the United States. It was captivating. It was fascinating. And, then, it was turned into just I guess tongue and cheek. Here's Atomic lanes. Here's Atomic bodyshop. Here is the Atomic motel.

There's a great film called the Atomic Café based upon the fact that there really was an Atomic Café, and then there's all these comic books. The Genre of comic books really picked up on the idea of mutation, what happens when the Atom is unleashed, and all these monsters, and, you know, everybody is familiar with the Genre. But, looking at the art associated with it is really quite fascinating.

Here is the logo of the Richland Bombers, Richland, Washington where one of the production--background production factories for the first bomb, and continuing on into later bombs in Richland, Washington. But, they actually adopted--the Bombers is the name of their team, their sports team, and look at the logo. Most definitely the mushroom cloud.

I'll just paw through a couple more of these. There's a video of an Atomic dog, and this was a popular kind of a C rate movie, I would say it's below an A and B, somewhere into the C, but, you know, animals get loose and they get irradiated at the test site, and they take on supernatural powers.

This is the prettiest one, in my opinion. There's

Atomic fireworks, celebrating again the spectacle of the bomb. This is probably the most grim. These are post cards, and here is--let me get this straight here. On the left, we have a post card of Vancouver, British Columbia, Canada, and the reverse side of the post card shows what would happen to Vancouver in the event, this is probably about a maybe 30 or 40 megaton bomb, and, of course, it's superimposed. This didn't really happen. But, it does give us an insight into all of the academic pursuit of what would happen if a place were bombed during the cold war.

The Soviets developed a bomb that was 60 megatons. That's just unfathomably large. The largest one we ever tested in Nevada was a mere 80 kilotons, and theirs, you know, is a ratio of a thousand, between a kiloton and a megaton. So, a 60 megaton bomb would take out not only Vancouver, like I say, this is probably a 30, I don't know what the idea was here, but if you exploded a 60 megaton bomb in the United States, on the West Coast, it would take out California. There is no doubt.

And, so, that's what we were up against, and this really is an example of the real legitimate fear that we were experiencing. And, here we have just kind of a funny view of what they call the priest of Gerlach, and he just wrote on a tombstone, "To crush the simple Atom, all mankind was intent, and now the Atom will return the complement. Wow." It will

crush us, in other words, really an ironic comment. But, it displays the legitimate concern and fear with the Jeanie out of the bottom. So, that's the Atomic pop, and I think it is well done by Artist Peter Goin.

MS. CLANCY: And, why don't we just right now give credit to the publisher, so we, you know, get that on.

MS. MACKEDON: Oh, the publisher of what?

MS. CLANCY: Of the book.

MS. MACKEDON: Blackrock Institute Press.

MS. JOHNSON: Michon, as you know, Nevada was targeted for the MX Missile Project in the late Seventies and very early Eighties.

MS. MACKEDON: Uh-huh.

MS. JOHNSON: Some people have compared the Yucca Mountain issue politically to the MX issue, and I was wondering what observations you have.

MS. MACKEDON: I think there are a lot of similarities. I mean, let's start first of all with just the tension between a massive federal government project, and the opposition that comes from people who actually live in the land and really don't want to see their place, their homeland characterized as a wasteland, and used, in the case of the MX missile, there would be 4500 separate missile silos dug into the sands of Utah and Nevada along the border there. And, it would literally tear up the landscape, but it would also

change the nature of both states.

And, these bunkers would hold silos. They were going to be--the actual weapons were going to be put on a racetrack, and the idea is that the Soviet Union would not know which silo had the live missile at which time. So, some people have called it the Atomic raceway, and various labels, yeah, for that kind of project.

So, we have the federal/local sort of tension on that project. We definitely have the language issue, where the Air Force came in and there were some really derogatory drawings of people living in Nevada, similar to what the Atomic Energy Commission had done earlier on. In a lot of their propaganda books, they show Nevadans as nare-do-wells, prostitutes, gamblers, or, you know, really simple minded people, cowboys who are almost falling off their horses, for example, or, you know, flummoxed by the site of an Atom. And, this really interested me as a researcher of language. So, I looked at some of the propaganda that came out during the MX years, and yes, it was similar in terms of picturing the people who lived in that part of the State, and in Western Utah as, first of all, almost no one. They used empty, barren, scattered population nomads over and over and over again, as they had with Atomic testing. And, then, Utah also came under that same onus.

The other thing that I see is that MX was really

thought of as a done deal. There was a lot of money put into MX. It had a lot of political support. And, what happened is really an interesting lesson in grassroots power, because you had several coalitions come together to defeat the MX, and including the Mormon Church. So, you have really religious and secular grassroots opponents. You had academics gather together. You had Mormons gather together. And, you had ranchers gather together, whose interests were really quite different when you look at the Nevada landscape. And, yet, they formed with the same kind of opposition.

It's similar in some ways to what I said about the sacred issue of Yucca Mountain. All three of these groups really considered Nevada and Utah in this borderland country along the Nevada/Utah border to be sacred land. It was sacred to the ranchers for their own reasons, sacred to the Mormons for their own reasons. They really felt that Zion is sacred. And, of course, sacred to academics who felt that there was a right to own your land, and that the government didn't have the federal power to come in and tell a state what they could or could not do.

MS. JOHNSON: The Native Americans, too.

MS. MACKEDON: And, Native Americans as well, yes, and that came up, came around again with Yucca Mountain. There's been just a tremendous outpouring of research material and emotion as well from the tribes on the Yucca

Mountain issue, because the Shoshone claimed that Yucca Mountain is theirs. It's their sacred mountain. It's their mother. It's their rock. It's their power rock.

And, so, all of these ideas about who owns the land was really put in a crucible with MX. And, the Air Force finally cancelled the plans. There was too much opposition. There were too many emotional responses. It just wasn't working for them. So, there's a good example of grassroots power.

MS. JOHNSON: Michon, thank you very much for your time.

MS. MACKEDON: Well, thank you. This has been interesting and fun, and I'd like to give credit to the Blackrock Institute Press, with their permission, you may quote me, you may quote from the book, you may use the photographs. And, I hope you all enjoy this interview and the book.

MS. JOHNSON: Thank you very much.

(Whereupon, the interview of Michon Mackedon was concluded.)

TRANSCRIBER'S CERTIFICATE

I hereby certify that the foregoing has been transcribed by me to the best of my ability, and constitutes a true and accurate transcript of the mechanically recorded proceedings in the above matter.

Dated at Aurora, Colorado, this 19th day of June, 2011.

s/s Mary Chevalier

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