

April 26, 2010

Mr. Randall K. Edington  
Executive Vice President, Nuclear  
Mail Station 7602  
Arizona Public Service Company  
P.O. Box 52034  
Phoenix, AZ 85072

SUBJECT: ISSUANCE OF ENVIRONMENTAL SCOPING SUMMARY REPORT  
ASSOCIATED WITH THE STAFF'S REVIEW OF THE APPLICATION BY  
ARIZONA PUBLIC SERVICE COMPANY FOR RENEWAL OF THE  
OPERATING LICENSE FOR PALO VERDE NUCLEAR GENERATING  
STATION, UNITS 1, 2, AND 3 (TAC NOS. ME0261, ME0262, ME0263)

Dear Mr. Edington:

The U.S. Nuclear Regulatory Commission (NRC) conducted a scoping process, from May 26, 2009 through July 27, 2009, to determine the scope of the NRC staff's environmental review of the application for renewal of the operating license for the Palo Verde Nuclear Generating Station, Units 1, 2, and 3 (PVNGS). As part of the scoping process, the NRC staff held two public environmental scoping meetings in Arizona on June 25 to solicit public input regarding the scope of the review. The scoping process is the first step in the development of a plant-specific supplement to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS)," for PVNGS.

The NRC staff has prepared the enclosed environmental scoping summary report identifying comments received at the June environmental scoping meetings, by letter, and by electronic mail. In accordance with 10 CFR 51.29(b), all participants of the scoping process will be provided with a copy of the scoping summary report. The transcripts of the scoping meetings are publicly available at the NRC Public Document Room (PDR), located at One White Flint North, 11555 Rockville Pike, Rockville, Maryland, 20852, or from the NRC's Agencywide Documents Access and Management System (ADAMS).

The ADAMS Public Electronic Reading Room is accessible at <http://adamswebsearch.nrc.gov/dologin.htm>. The transcripts for the afternoon and evening meetings are listed under Accession Nos. ML092040121 and ML092040125, respectively. Persons who do not have access to ADAMS, or who encounter problems in accessing the documents located in ADAMS, should contact the NRC's PDR reference staff by telephone at 1-800-397-4209, or 301-415-4737, or by e-mail at [pdr@nrc.gov](mailto:pdr@nrc.gov).

R. Edington

- 2 -

The next step in the environmental review process is the issuance of a draft supplement to the GEIS scheduled for June of 2010. Notice of the availability of the draft supplement to the GEIS and the procedures for providing comments will be published in an upcoming *Federal Register* notice.

If you have any questions concerning the NRC staff review of the PVNGS license renewal application, please contact Mr. David Drucker, Senior Project Manager at 301-415-6223 or [David.Drucker@nrc.gov](mailto:David.Drucker@nrc.gov).

Sincerely,

Jay Robinson, Chief */RA/*  
Program Operations Branch  
Division of License Renewal  
Office of Nuclear Reactor Regulation

Docket Nos. 50-528, 50-529, and 50-530

Enclosure:

1. Scoping Summary Report

cc w/encl: see next page

R. Edington

- 2 -

The next step in the environmental review process is the issuance of a draft supplement to the GEIS scheduled for June of 2010. Notice of the availability of the draft supplement to the GEIS and the procedures for providing comments will be published in an upcoming *Federal Register* notice.

If you have any questions concerning the NRC staff review of the PVNGS license renewal application, please contact Mr. Dave Drucker, Senior Project Manager at 301-415-6223 or [David.Drucker@nrc.gov](mailto:David.Drucker@nrc.gov).

Sincerely,

Jay Robinson, Chief */RA/*  
Program Operations Branch  
Division of License Renewal  
Office of Nuclear Reactor Regulation

Docket Nos. 50-528, 50-529, and 50-530

Enclosure:

1. Scoping Summary Report

cc w/encl: see next page

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**ADAMS Accession No.: ML100820451**

OFFICE	LA:DLR	PM:DLR:RPOB	OGC	BC:DLR:RPOB
NAME	S. Figueroa	D. Drucker	D. Roth	J. Robinson
DATE	03/25/10	03/25/10	03/30/10	04/26/10

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Letter to Randall K. Edington from Jay Robinson dated April 26, 2010.

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Palo Verde Nuclear Generating Station,  
Units 1, 2, and 3

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Palo Verde Nuclear Generating Station, - 2 -  
Units 1, 2, and 3

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Sacaton, AZ 85247

**Environmental Impact Statement  
Scoping Process**

**Summary Report**

**Palo Verde Nuclear Generating Station,  
Units 1, 2, and 3  
Maricopa County, Arizona**

**April 2010**



**U.S. Nuclear Regulatory Commission  
Rockville, Maryland**

ENCLOSURE

## Introduction

On December 15, 2008, the Nuclear Regulatory Commission (NRC) received an application from Arizona Public Service Company (APS) dated December 11, 2008, for renewal of the operating licenses of the Palo Verde Nuclear Generating Station, Units 1, 2, and 3 (PVNGS). The PVNGS units are located in Maricopa County, Arizona. As part of the application, Arizona Public Service Company (APS) submitted an environmental report (ER) prepared in accordance with the requirements of Title 10, Part 51 of the *Code of Federal Regulations* (10 CFR Part 51). This part of the regulations contains the NRC requirements for implementing the National Environmental Policy Act (NEPA) of 1969 and the implementing regulations promulgated by the Council on Environmental Quality (CEQ). Section 51.53 outlines requirements for preparation and submittal of environmental reports to the NRC.

Section 51.53(c)(3) to 10 CFR Part 51 was based upon the findings documented in NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," (GEIS). The GEIS, in which the staff identified and evaluated the environmental impacts associated with license renewal, was first issued as a draft for public comment. The staff received input from Federal and State agencies, public organizations, and private citizens before developing the final document. As a result of the assessments in the GEIS, a number of impacts were determined to be small and to be generic to all nuclear power plants. These were designated as Category 1 impacts. An applicant for license renewal may adopt the conclusions contained in the GEIS for Category 1 impacts, absent new and significant information that may cause the conclusions to fall outside those of the GEIS. Category 2 impacts are those impacts that have been determined to be plant-specific and are required to be evaluated in the applicant's ER.

The Commission determined that the NRC does not have a role in energy planning decision-making for existing plants, which should be left to state regulators and utility officials. Therefore, an applicant for license renewal need not provide an analysis of the need for power or the economic costs and economic benefits of the proposed action. Additionally, the Commission determined that the ER need not discuss any aspect of storage of spent fuel for the facility that is within the scope of the generic determination in 10 CFR 51.23(a) and in accordance with 10 CFR 51.23(b). This determination was based on the Nuclear Waste Policy Act of 1982 and the Commission's Waste Confidence Rule contained in 10 CFR 51.23.

On May 26, 2009, the NRC published a Notice of Intent in the *Federal Register* (74 FR 24884), to notify the public of the staff's intent to prepare a plant-specific supplement to the GEIS regarding the renewal application for the Palo Verde operating licenses. The plant-specific supplement to the GEIS will be prepared in accordance with NEPA, CEQ guidelines, and 10 CFR Part 51. As outlined by NEPA, the NRC initiated the scoping process with the issuance of the *Federal Register* Notice. The NRC invited the applicant, federal, state, and local government agencies, local organizations, and individuals to participate in the scoping process by providing oral comments at the scheduled public meetings and/or submitting written suggestions and comments no later than July 27, 2009. The scoping process included two public scoping meetings on June 25, 2009 held near the PVNGS site. An afternoon session was conducted at the Tonopah Valley High School, 38201 West Indian School Road, Tonopah, Arizona 85354. An evening session was held at the Estrella Mountain Community College,

3000 North Dysart Road, Avondale, Arizona 85392. The NRC issued press releases and distributed flyers locally. Approximately 60 people attended the meetings. Both sessions began

with NRC staff members providing a brief overview of the license renewal process and the NEPA process. Following the NRC's prepared statements, the meetings were open for public comments. Twelve (12) attendees provided either oral comments or written statements that were recorded and transcribed by a certified court reporter. The official corrected transcripts for the afternoon and evening meetings are publicly available at the NRC Public Document Room (PDR), located at One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852, or from the NRC's Agencywide Documents Access and Management System (ADAMS). The ADAMS Public Electronic Reading Room is accessible at <http://adamswebsearch.nrc.gov/dologin.htm>. The transcripts for the afternoon and evening meetings are listed under Accession Nos. ML092040121 and ML092040125, respectively. A summary of the meeting, which was issued on August 4, 2009, is listed under Accession No. ML091900138. Persons who do not have access to ADAMS, or who encounter problems in accessing the documents located in ADAMS, should contact the NRC's Public Document Room Reference staff by telephone at 1-800-397-4209, or 301-415- 4737, or by e-mail at [pdrc@nrc.gov](mailto:pdrc@nrc.gov).

The scoping process provides an opportunity for public participation to identify issues to be addressed in the plant-specific supplement to the GEIS and highlight public concerns and issues. The Notice of Intent identified the following objectives of the scoping process:

- Define the proposed action
- Determine the scope of the supplement to the GEIS and identify significant issues to be analyzed in depth
- Identify and eliminate peripheral issues
- Identify any environmental assessments and other environmental impact statements being prepared that are related to the supplement to the GEIS
- Identify other environmental review and consultation requirements
- Indicate the schedule for preparation of the supplement to the GEIS
- Identify any cooperating agencies
- Describe how the supplement to the GEIS will be prepared

At the conclusion of the scoping period, the NRC staff and its contractor reviewed the transcripts and all written material received, and identified individual comments. Twenty-two (22) letters, emails, or documents containing comments were also received during the scoping period. All comments and suggestions received orally during the scoping meetings or in writing were considered. Each set of comments from a given commenter was given a unique alpha identifier (Commenter ID letter), allowing each set of comments from a commenter to be traced back to the transcript, letter, or email in which the comments were submitted.

Several commenters submitted comments through multiple sources (e.g., letter and afternoon or evening scoping meetings). Comments were consolidated and categorized according to the

topic within the proposed supplement to the GEIS or according to the general topic if outside the scope of the GEIS. Comments with similar specific objectives were combined to capture the common essential issues that had been raised in the source comments. Once comments were grouped according to subject area, the staff determined the appropriate action for the comment.

Table 1 identifies the individuals providing comments and the Commenter ID letter associated with each person's set(s) of comments. The Commenter ID letter is preceded by PV (short for Palo Verde Nuclear Generating Station). For oral comments, the individuals are listed in the order in which they spoke at the public meeting. Accession numbers indicate the location of the written comments in ADAMS.

**TABLE 1 - Individuals Providing Comments During Scoping Comment Period**

<b>Commenter ID</b>	<b>Commenter</b>	<b>Affiliation (If Stated)</b>	<b>ADAMS Accession Number</b>
PV-A	Mary Widner	Local resident	ML092040121
PV-B	Mr. Armiger	Local resident	ML092040121
PV-C	Mr. Herring	Local resident	ML092040121
PV-D	Stephen Brittle	President, Don't Waste Arizona	ML092040125
PV-E	Darah Mann	Director of Marketing, Western Maricopa Coalition	ML092040125
PV-F	Ms. Hohmu	Southwest Valley Chamber of Commerce	ML092040125
PV-G	Adolfo Gamez	Mayor of Tolleson, AZ	ML092040125
PV-H	John Findley	Local resident	ML092040125
PV-I	Glenn Hamer	Pres., & CEO, AZ Chamber of Commerce and Industry	ML092040125
PV-J	Felipe Zubia	DMB Associates, developer of Verrado, a community 30 miles east	ML092040125
PV-K	Armando Contreras	Pres., & CEO, AZ Hispanic Chamber of Commerce	ML092040125
PV-L	Jackie Meck	Mayor, Buckeye, AZ	ML092040125
PV-M	James Cavanaugh	Mayor, Goodyear, AZ	ML092110634
PV-N	Bas Aja	Executive Vice President, Arizona Cattle Feeders' Association	ML092110635
PV-O	Jack Harper	Senator, AZ Legislative District 4	ML092110636
PV-P	Connie Wilhelm	Pres., & Exec Dir, Home Builders Association of Central Arizona	ML092110637
PV-Q	Mary Peters	Former U.S. Secretary of Transportation 2006-2009	ML092180409
PV-R	Louis J. Manuel Jr.	Chairman, Ak-Chin Indian Community	ML092180427
PV-S	Phil Gordon	Mayor, Phoenix, AZ	ML092180666
PV-T	Tom Boone	Representative, AZ Legislative District 4	ML092180428
PV-U	Tom Kelly	U.S. EPA, Region IX, Envr Review Office,	ML092180429

<b>Commenter ID</b>	<b>Commenter</b>	<b>Affiliation (If Stated)</b>	<b>ADAMS Accession Number</b>
		Communities and Ecosystems Division	
PV-V	Deanna K. Kupcik	President/CEO, Buckeye Valley, Chamber of Commerce	ML092180430
PV-W	Patricia Fleming	AZ State Representative, District 25	ML092180431
PV-X	Judy Burges	Representative, AZ Legislative District 4	ML092220044
PV-Y	Todd Sanders	Pres., & CEO Greater Phoenix Chamber of Commerce	ML092370065
PV-Z	Chris Horyza	Planning and Environmental Coordinator, Bureau of Land Management, Arizona State Office	ML091730377
PV-AA	Steve Brittle	President, Don't Waste Arizona	ML092720530
PV-AB	Steve Brittle	President, Don't Waste Arizona	ML092720533
PV-AC	Steve Brittle	President, Don't Waste Arizona	ML092160241
PV-AD	Steve Brittle	President, Don't Waste Arizona	ML092160239
PV-AE	Steve Brittle	President, Don't Waste Arizona	ML092160232

The comments and suggestions received as part of the scoping process are documented in this section and the disposition of each comment is discussed. Comments are grouped by category. The categories are as follows:

1. Comments Regarding License Renewal and Its Processes
2. Comments Concerning Water Quality and Use
3. Comments Concerning Air Quality
4. Comments Concerning Human Health
5. Comments Concerning Alternatives
6. Comments Concerning Issues Outside the Scope of License Renewal: Support for License Renewal, Security and Terrorism, Emergency Response and Preparedness, Plant Performance, Energy Costs, and Other Out of Scope Issues

Each comment is provided in the following pages. For reference, the unique identifier for each comment (Commenter ID letter listed in Table 1 plus the comment number) is provided. In those cases where no new environmental information was provided by the commenter, no further evaluation will be performed.

The preparation of the plant-specific supplement to the GEIS (which is the SEIS) will take into account all the relevant issues raised during the scoping process. The SEIS will address both Category 1 and 2 issues, along with any new information identified as a result of scoping. The SEIS will rely on conclusions supported by information in the GEIS for Category 1 issues, and will include the analysis of Category 2 issues and any new and significant information. The draft plant-specific supplement to the GEIS will be made available for public comment. The comment period will offer the next opportunity for the applicant, interested Federal, State, and local government agencies, local organizations, and members of the public to provide input to the NRC's environmental review process. The comments received on the draft SEIS will be

considered in the preparation of the final SEIS. The final SEIS, along with the staff's Safety Evaluation Report (SER), will provide much of the basis for the NRC's decision on the PVNGS license renewal application.

**Palo Verde Nuclear Generating Station (Palo Verde), Units 1, 2 and 3  
Public Scoping Meeting  
Comments and Responses**

The comments and suggestions received as part of the scoping process are discussed below. Parenthetical numbers after each comment refer to the Commenter's ID letter and the comment number. Comments can be tracked to the commenter and the source document through the ID letter and comment listed in Table 1.

**1. Comments Regarding License Renewal and Its Processes**

**Comment:** My name is John Findley. I'm here tonight representing myself as a member of the public. I want to thank the NRC for coming to Arizona from their home in Rockville, which we know is next to paradise. And I just wish at this point to express my concern about some of the issues that have been brought up tonight and express my hopes that the NRC will examine this in a thorough and extensive process that you have set out in the table that you laid out. Concerns involve the uneven performance of Palo Verde in the past, along with the uncertain future of long-term storage for nuclear waste; I think that's a really important issue that has to be taken into consideration. And probably most of all and as has been pointed out, the aging infrastructure that we're dealing with.

The implications of this are basically unknown. We've had incidents in the past in other locations where corrosion and the effects of radiation on the physical infrastructure have gone unnoticed in spite of continued surveillance and this has to be something that is taken into consideration.

(PV-H)

**Comment:** With regard to the existing Palo Verde facility, we recommend the DEIS include: an evaluation of environmental justice concerns, based on CEQ guidance<sup>1</sup>; a summary of routine releases and a description of any non-routine releases; a discussion of the capacity and adequacy of nuclear waste storage for an additional twenty years or more; an updated estimate to decommission the facility; and financial assurance mechanisms in place to ensure proper decommissioning in the event of bankruptcy on the part of the owner.

<sup>1</sup>Environmental Justice Guidance under 'the National Environmental Policy Act; Appendix A (Guidance for Federal Agencies on Key Term is in Executive Order 12898), CEQ, December 10, 1997.

(PV-U-2)

**Response:** *The comments, in general, express concern with the thoroughness of the license renewal process. Overall, NRC has developed a comprehensive license renewal process to evaluate applications for extended periods of operation.*

*In 1982, the NRC established a comprehensive program for Nuclear Plant Aging Research as the result of a widely attended workshop on nuclear power plant aging. Based on the results of that research, a technical review group concluded that many aging phenomena were readily manageable and did not pose technical issues that would preclude life extension for nuclear power plants.*

*The NRC also concluded that the existing regulatory requirements governing a nuclear reactor facility would offer reasonable assurance of adequate protection if the license were renewed, provided that the current licensing basis was modified to account for age-related safety issues. In 1991, the Commission approved a rule on the technical requirements for license renewal and published the rule in the Code of Federal Regulations, 10 CFR Part 54. The NRC then undertook a demonstration program to apply the rule to pilot plants and to develop experience to establish implementation guidance. The rule defined the scope as age-related degradation unique to license renewal. However, during the demonstration program, the NRC found that many aging effects are managed adequately during the initial license period. In addition, the NRC found that the review did not allow sufficient credit for existing programs, particularly the maintenance rule, which also helps manage plant-aging phenomena.*

*As a result, in 1995, following the rulemaking process, the NRC amended the license renewal rule. The amended rule in 10 CFR Part 54 established a regulatory process that is more effective, stable and predictable than the previous license renewal rule. In particular, Part 54 was clarified to focus on managing the adverse effects of aging. The rule changes were intended to ensure that important systems, structures, and components would continue to perform their intended function during the 20-year period of extended operation.*

*Concerning uneven plant performance, the NRC will ensure that the safety of a currently operating power plant will continue to be maintained before renewing the license by ensuring that aging effects will be adequately managed and that the licensing basis related to the present plant design and operation will be maintained. Before a new license is issued, the NRC will ensure that there is a technically credible and legally sufficient basis for granting a new license for an extended 20 years as reflected in the NRC's safety evaluation report (SER), final SEIS, and the proposed new license.*

*The comments, in specific, express concern with the following topics:*

*History of plant performance - the NRC will ensure that the safety of a currently operating power plant will continue to be maintained before renewing the license by ensuring that aging effects will be adequately managed and that the licensing basis related to the present plant design and operation will be maintained. Before a new license is issued, the NRC will ensure that there is a technically credible and legally sufficient basis for granting a new license for an extended 20 years as reflected in the NRC's safety evaluation report (SER), final SEIS, and the proposed new license.*

*Nuclear waste storage - the staff notes that on March 3, 2010, DOE submitted a motion to the Atomic Safety and Licensing Board to withdraw with prejudice its application for a permanent geologic repository at Yucca Mountain, Nevada. Nevertheless, the safety and environmental effects of spent fuel storage have been evaluated by the NRC and, as set forth in the Waste Confidence Rule (10 CFR 51.23), the NRC generically determined that such storage could be*

*accomplished without significant environmental impacts. In the Waste Confidence Rule, the Commission determined that spent fuel can be safely stored onsite for at least 30 years beyond the plants life, including license renewal. In 10 CFR Part 51, on site spent fuel storage is classified as a Category 1 issue that is applicable to all nuclear power plant sites. While the Commission did not assign a single level of significance (i.e., Small, Moderate, or Large) in Table B-1 of Appendix B to Subpart A to Part 51 for the impacts associated with spent fuel and high level waste disposal, it did conclude that the impacts are acceptable in that these impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR Part 54 should be eliminated.*

*The GEIS for license renewal (NUREG-1437) evaluated a variety of spent fuel and waste storage scenarios, including on site storage of these materials for up to 30 years following expiration of the operating license, transfer of these materials to a different plant, and transfer of these materials to an Independent Spent Fuel Storage Installation (ISFSI). During dry cask storage and transportation, spent nuclear fuel must be "encased" in NRC-approved casks. An NRC-approved cask is one that has undergone a technical review of its safety aspects and been found to meet all of the NRC's requirements. These requirements are specified in 10 CFR Part 72 for storage casks and 10 CFR Part 71 for transportation casks. For each potential scenario involving spent fuel, the GEIS determined that existing regulatory requirements, operating practices, and radiological monitoring programs were sufficient to ensure that impacts resulting from spent fuel and waste storage practices during the term of a renewed operating license would be small, and is a Category 1 issue.*

*Aging Infrastructure – The principle safety concerns associated with license renewal are related to the aging of structures, systems and components important to the continued safe operation of the facility. When the plants were designed, certain assumptions were made about the length of time each plant would be operated. During the safety review for license renewal, the NRC must determine whether aging effects will be adequately managed so that the original design assumptions will continue to be valid throughout the period of extended operation or verify that any aging effects will be adequately managed. For all aspects of operation, other than the aging management during the period of extended operation, there are existing regulatory requirements governing a plant that offer reasonable assurance of adequate protection if its license were renewed. The NRC's environmental review is confined to environmental matters relevant to the extended period of operation requested by the applicant. Safety matters related to aging are outside of the scope of this review. An NRC safety review for the license renewal period is conducted separately. The comment provides no new information and will not be evaluated further in the context of the environmental review.*

*Environmental Justice - The comment regarding Environmental Justice is noted. Environmental Justice will be addressed in Chapters 2 and 4 of the PVNGS SEIS.*

*Routine and non-routine releases - the comment regarding a summary of routine releases and a description of any non-routine releases is noted. The NRC staff will evaluate the applicant's routine and non-routine releases will be addressed in Chapters 2 and 4 of the PVNGS SEIS.*

*Financial assurance of decommissioning - the comment regarding financial assurance of decommissioning is noted. Decommissioning funding assurance is outside the scope of license renewal. Decommissioning funding assurance is addressed pursuant to the requirements of 10*

*CFR 50.75(f)(1). Arizona Public Service Company (APS) submitted the 2008 Decommissioning Funding Status Report for Palo Verde Nuclear Generating Station Units 1, 2, and 3 (ML091030418, dated March 31, 2009). NRC staff reviewed this document and found APS to be providing decommissioning funding assurance.*

## **2. Comments Concerning Water Quality and Use**

**Comment:** Another issue I call "Water." With global warming projections indicating a hotter, drier southwest, we must be reminded that the vast majority of wastewater from the Phoenix metro area, mainly the discharge from the 91st Avenue Wastewater Treatment Plant in west Phoenix, goes to cool Palo Verde.

With hotter temperatures expected, even more water will be needed and nuclear power already uses more power per megawatt of power generated than any other form of electrical power generation.

Is this sustainable? Is this water supply for Palo Verde really reliable and sufficient? Is this projected Palo Verde water usage a severe economic disincentive to overall economic growth and even population growth in this part of Arizona? Are the water needs of Palo Verde a type of opportunity cost and opportunity loss brought about by a lack of affordable water for industrial and residential uses?

(PV-D-8)

**Comment:** The Maricopa Association of Governments (MAG) is the regional planning organization of local government in Maricopa County. MAG's Transportation Policy Committee has "Interstates 8 and 10-Hidden Valley Transportation Framework Study" as one of its upcoming agenda items. This is an early attempt at planning for the transportation needs of a projected population of 2.5 million people in the western part of Maricopa County. That population is almost the size of the Phoenix metro area now.

The NRC needs to fully examine the planned population growth in that area near Palo Verde, and especially in the context of planned or needed groundwater pumping and the potential land subsidence and fissuring, again especially in the area near and including Palo Verde. Some areas of Arizona are especially prone to subsidence and fissuring.

(PV-AB-1)

**Response:** *The comments are noted. The comments, in general, pertain to the plant's consumptive use of waste water from the Phoenix metro area, groundwater resources in the vicinity of PVNGS, and the plant's potential impact on subsidence and fissuring. Groundwater use and water quality issues are Category 2 issues and will be addressed in Chapters 2 and 4 of the PVNGS SEIS.*

## **3. Comments Concerning Air Quality**

**Comment:** Next topic, carbon impacts. If uranium demand rises as projected, the carbon cost of developing less rich ores nullifies any presumed carbon savings from keeping their reactors online. Isn't it likely that the true life lifecycle carbon emissions of nuclear power generation will be officially recognized by the EPA and the U.S. Congress, and carbon cap and trade or carbon

tax strategies will make nuclear power even more unprofitable?

Nuclear power is not at all free from carbon emissions. A number of recent studies have found out that when mining, processing, and extensive transportation of uranium in order to make nuclear fuel is considered, the release of carbon dioxide as a result of making electricity from uranium is comparable to converting natural gas into electric power.

Additional energy required for decommissioning and disposition of the wastes generated increases this carbon dioxide output substantially.  
(PV-D-9)

**Comment:** In addition to radiological pollution, nuclear power also contributes massive thermal pollution to both our air and water. It has been estimated that every nuclear reactor daily releases thermal energy –heat– that is in excess of the heat released by the detonation of a 15 kiloton nuclear bomb blast. Nuclear power contributes significantly to the thermal energy inside Earth’s atmosphere, making it contraindicated at this time of rapid global warming.

Nuclear power is not at all free from carbon emissions. A number of recent studies have found that when mining, processing, and extensive transportation of uranium in order to make nuclear fuel is considered, the release of carbon dioxide (CO<sub>2</sub>) as the result of making electricity from uranium is comparable to burning natural gas to make electric power. Additional energy required for decommissioning and disposition of the wastes generated increases this CO<sub>2</sub> output substantially. What if the national and worldwide economic downturn causes a downgrade of the economic viability of funds set aside for decommissioning of Palo Verde? Putting decommissioning off even further increases uncertainty, in light of massive resource depletion and environmental deterioration aspects like global warming. All of these issues need to be analyzed and mitigated.  
(PV-AB-7)

**Response:** *The comments are noted, and pertain to impacts to air quality from carbon emissions. Impacts to air quality from carbon emissions associated with the uranium fuel cycle will be evaluated in Chapter 6 of the PVNGS SEIS.*

#### **4. Comments Concerning Human Health**

**Comment:** My name is Stephen Brittle, I'm the president of Don't Waste Arizona, a nonprofit environmental organization, 501(c)(3)(7) here in Arizona. On behalf of the organization and its effect of their concerns are these comments on the record:

Thank you for the opportunity to submit concerns and questions about the wisdom of renewing the license of an aging, severely—troubled, nuclear power plant complex that has caused significant economic hardship for a financially troubled company that just asked for a rate increase to forestall an even worse credit rating.

The first concern I have is that in April, there was a meeting and you let them off the hook for their closer scrutiny. I was frankly disappointed that NRC representatives seemed unaware of the plume of tritium under the nuclear plant; something I found out about by looking through the facility's file at the Arizona Department of Environmental Quality. And the fact that they didn't seem to know about it raised real questions about NRC's oversight.

I understand that the plume was caused by the monsoon rains knocking the normal radioactive air emissions from Palo Verde onto the roof of the facility that then drained into an unpaved area where it soaked into the ground. Levels of tritium in the ground seemed likely to increase. I remind everyone that the National Academy of Sciences agrees there is no safe dose. According to the National Academy of Sciences in 2005, there is no threshold dose below which ionizing radiation is safe.

And years before that, it stated there is no safer level of exposure, there is no dose of ionizing radiation so low that the risk of a malignancy is zero; that's from Dr. Karl Morgan, the father of health physics.

Historically, the significance of internal dosage from fission products has not been appreciated. There is something that is called "Reference Man" and these standards ignore those most at risk.

Women are 52 percent more likely to get cancer from the same amount of radiation dose compared to men. Children are at greater risk, of course, than adults.

A female infant has about a seven times greater chance of getting cancer than a 30—year old male with the same radiation exposure. Pregnant women and the developing fetus are particularly vulnerable to radiation exposure; however, non-cancer reproductive effects are not part of the U.S. Regulatory framework for radiation protection.

U.S. Radiation exposure regulations and compliance methods often fail women, children, and other more radiosensitive groups because they are based on the reference man; a hypothetical 20 to 30 year old Caucasian male.

At least three federal agencies, the Environmental Protection Agency, the NRC, and the Department of Energy, still use reference man in radiation dose regulations and compliance assessment including the Clean Air Act and safe drinking water rules despite evidence that the standard is not adequate to protect many groups.

In both France and the U.S., for nearly 30 years after the first reactors went on line, no studies of cancer near reactors were done. Neither utilities nor the NRC conducts health studies; neither monitor local cancer rates near reactors, yet both strongly criticize any studies that suggest harm. One is left wondering who to trust.

Look at the French. Official French statistics, among 39 European nations the 2006 cancer incidence rate is the third highest for men and 13th highest for women. The incidence rates rose 39 percent from 1980 to 2005 compared to 10 percent in the United States.

Perhaps most telling, the thyroid cancer rate in France rose a staggering 433 percent for males and 186 percent for females, far more than in the U.S. A clue and indicator, if not a smoking gun. Doctors know of no other clear cut cause of thyroid cancer other than radiation exposure. The thyroid cancer rates in the four counties closest to Indian Point, for example, are nearly double the U.S. average, and that childhood cancer in these counties is also above the national rate.

Something called the Mother's Milk Project, also this year; of 30 milk samples from breastfeeding mothers and goats within 50 miles of Indian Point, nearly all revealed levels of strontium—90 with the highest results occurring closest to the Indian Point reactors.

Of great concern, the presence of both strontium—90 and a related fission product strontium—89, which has a short half life. Its presence provides strong evidence radioactivity was recently produced from a nearby source.

(PV-D-1)

**CHICAGO, Illinois, July 27, 2009 --/WORLD-WIRE/--** Nuclear reactors in the United States should be phased out, and replaced by technologies that don't threaten public health with the emission of radioactive chemicals, urges the Cancer Prevention Coalition.

A recent energy bill sponsored by Congressional Republicans proposed building 100 new nuclear reactors across the United States in the next 20 years.

The proposal, which would double the current U.S. total of 104 operating nuclear reactors, would amount to a nuclear renaissance, as no new reactors have been ordered since 1978.

Concerns about global warming gave utilities the idea for this revival since reactors don't emit greenhouse gases while generating power, and utilities have stopped closing old reactors while proposing 33 new ones to be sited in New England, throughout the South and Southeast, and in Texas, Utah and Idaho.

(For a list of applications to the Nuclear Regulatory Commission for approval of new reactors click here. <http://www.nrc.gov/reactors/new-reactors/new-licensingfiles/expected-new-rx-applications.pdf>)

But this month, two Swedish scientists published an article concluding that a large increase in nuclear reactors will not solve global warming.

The utilities, of course, fail to report that greenhouse gases are emitted throughout the entire nuclear fuel cycle, and operating the reactor itself is the only exception. Both the nuclear reactor industry and its support industries spew radioactive materials into local air and water, posing a serious health hazard, warns Dr. Samuel S. Epstein, chairman of the Cancer Prevention Coalition and Professor emeritus Environmental & Occupational Medicine at the University of Illinois at Chicago School of Public Health.

In the 1970s, Wall Street investors stopped funding new reactor projects due to cost and safety concerns. Today, these issues are unchanged, and private investors again gave a thumbs-down to nuclear power. A 2005 law authorizing \$18.5 billion in federal loan guarantees would only cover two reactors.

The Bush administration was a willing partner in the nuclear revival. George W. Bush became the first sitting U.S. president to visit a nuclear plant since a grim-faced President James Carter toured the damaged Three Mile Island reactor on April 1, 1979.

President Barack Obama has poured cold water on the renaissance. He rejected a request for \$50 billion in loan guarantees in the stimulus package. Additionally, he rejected further funding for developing the nuclear waste dump at Yucca Mountain Nevada, leaving utilities with no place to permanently store their highly radioactive nuclear waste. It is now being held temporarily at 55 storage sites licensed by the Nuclear Regulatory Commission and at Department of Defense sites and national laboratories across the country.

The major threat posed by nuclear reactors is not the addition of new reactors, but continuing to operate old and corroding ones, says Dr. Epstein. U.S. reactors are granted licenses for 40 years, and many are approaching that mark. Many utilities have asked regulators to extend their licenses for an additional 20 years.

"Each of the first 52 requests has been given a rubber-stamp approval, even though operating a 60 year old reactor would be a huge risk to human health," says Joseph Mangano, MPH, MBA, executive director of the Radiation and Public Health Project. Notable exceptions are state government officials in New York and New Jersey, who are opposing the attempts to extend licenses for reactors in their states.

About 80 million Americans in 37 states live within 40 miles of a nuclear reactor, including residents of New York City, Chicago, Philadelphia, Detroit, Miami, Phoenix, Cleveland, and Boston. "If a meltdown were to occur, safe evacuation would be impossible and many thousands would suffer from radiation poisoning or cancer," warns Dr. Epstein. "The horrifying specter of Chernobyl, or of terrorists attacking a nuclear plant, is not lost on concerned Americans."

Reactors are a real health threat, not just a potential one, a fact largely ignored by mainstream media, he declares.

To generate electricity, over 100 radioactive chemicals are created – among the most dangerous chemicals on Earth, and the same toxic mix in atomic bomb test fallout. These gases and particles, including Strontium-90, Cesium-137, and Plutonium-239, are mostly stored as waste. But some must be routinely released into air and water. Humans breathe, eat, and drink them - just as they did bomb fallout - raising the cancer risk, especially to children.

Industry and government officials argue that reactor emissions are too small to cause harm. But for years, scientists have produced study after study documenting high cancer rates near reactors. For example, a 2007 review of the scientific literature by researchers from the University of South Carolina found elevated rates of childhood cancers, particularly leukemia and brain cancers, in nearly all 17 studies examined. A 2008 study of German reactors was one of the largest ever done, and it also found high local rates of child cancer.

Mangano and colleagues published a January 2002 article in the journal "Archives of Environmental Health," showing that local infant deaths and child cancer cases plunged dramatically right after shut down whenever a U.S. reactor closed. Because the very young suffer most from radiation exposures, they benefit most when exposures are removed. This research indicated that there would be approximately 18,000 fewer infant deaths and 6,000 fewer child cancer cases over the next 20 years if all nuclear reactors were closed.

Over half the states in the United States, 31, currently host nuclear power plants.

Illinois has the most with 11, Pennsylvania has nine, New Jersey has four. While waiting for the federal government to phase out nuclear power in favor of safer alternatives, state governments should act to warn and protect their citizens, urges the Cancer Prevention Coalition.

Governors have responsibilities to take whatever political action they can to phase-out nuclear plants. In the first instance, governors should tell their citizens of the danger.

In 1954, Atomic Energy Chairman Lewis Strauss declared nuclear power “too cheap to meter.” President Richard Nixon envisioned that the nation would have 1,000 reactors by this time. But the dreams of people like Strauss and Nixon were dashed by staggering costs and built-in dangers.

The attempt to revive this Cold War-era dream has been, and still is, largely talk. While the talk goes on, the nation is fast developing technologies like solar and wind power, which never run out and don't pollute. Putting millions of Americans at risk of cancer by hanging on to old reactors – that produce only 19% of America's electricity and 8% of the country's total energy – is a reckless gamble. Nuclear reactors in the U.S. should be phased out, and replaced by options that don't threaten public health.

(PV-AE)

**Response:** *The NRC staff will address the radiological impacts to human health during its evaluation of the Palo Verde license renewal application. However, the radiological impact to human health is a Category 1 issue. This means that technical issues classified as Category 1 in Table B-1 of 10 CFR Part 51 have been generically evaluated in the Generic Environmental Impact Statement (GEIS) for license renewal and are not specifically reevaluated in the site-specific supplemental environmental impact statement (SEIS) unless new and significant information is identified. During the environmental review, the NRC staff will make a concerted effort to determine whether any new and significant information exists at Palo Verde that would change the generic conclusion for a Category 1 issue into a Category 2 issue. Category 2 issues are site specific issues which must be thoroughly analyzed by the applicant as part of its submittal and included in detail in its environmental report. The NRC staff would then independently evaluate the issue as part of its SEIS.*

*In response to your concerns on the radiological impact to human health, the NRC staff offers the following information for your consideration.*

*The NRC's primary mission is to protect the public health and safety and the environment from the effects of radiation from nuclear reactors, materials, and waste facilities. The NRC's regulatory limits for radiological protection are set to protect workers and the public from the harmful health effects (i.e., cancer and other biological impacts) of radiation on humans. The limits are based on the recommendations of standards-setting organizations. Radiation standards reflect extensive scientific study by national and international organizations. The NRC actively participates and monitors the work of these organizations to keep current on the latest trends in radiation protection. If the NRC determines that there is a need to revise its radiation protection regulations, it will initiate a rulemaking. The models recognized by the NRC for use by nuclear power reactors to calculate dose incorporate conservative assumptions and*

*do account for differences in gender and age to ensure that workers and members of the public are adequately protected from radiation.*

*Although radiation may cause cancers at high doses and high dose rates, currently there are no reputable scientifically conclusive data that unequivocally establish the occurrence of cancer following exposure to low doses, below about 10 rem (0.1 Sv). However, radiation protection experts conservatively assume that any amount of radiation may pose some risk of causing cancer or a severe hereditary effect and that the risk is higher for higher radiation exposures. Therefore, a linear, no-threshold dose response relationship is used to describe the relationship between radiation dose and detriments such as cancer induction. Simply stated, any increase in dose, no matter how small, results in an incremental increase in health risk. This theory is accepted by the NRC as a conservative model for estimating health risks from radiation exposure, recognizing that the model probably over-estimates those risks. Based on this theory, the NRC conservatively establishes limits for radioactive effluents and radiation exposures for workers and members of the public. While the public dose limit in 10 CFR Part 20 is 100 mrem (1 mSv) for all facilities licensed by the NRC, the NRC has imposed additional constraints on nuclear power reactors. Each nuclear power reactor, including Palo Verde, has enforceable license conditions that limit the total annual whole body dose to a member of the public outside the facility to 25 mrem (0.25 mSv). In addition, there are license conditions to limit the dose to a member of the public from radioactive material in gaseous effluents to an annual dose of 15 mrem (0.15 mSv) to any organ and for radioactive liquid effluents, a dose of 3 mrem (0.03 mSv) to the whole body and 10 mrem (0.1 mSv) to any organ.*

*The amount of radioactive material released from nuclear power facilities is well measured, well monitored, and known to be very small. The doses of radiation that are received by members of the public as a result of exposure to nuclear power facilities are so low (i.e., less than a few millirem) that resulting cancers attributed to the radiation have not been observed and would not be expected. To put this in perspective, each person in this country receives a total annual dose of about 300 millirems (3 mSv) from natural sources of radiation (i.e., radon, 200 mrem; cosmic rays, 27 mrem; terrestrial (soil and rocks), 28 mrem; and radiation within our body, 39 mrem) and about 63 mrem (0.63 mSv) from man-made sources (i.e., medical x-rays, 39 mrem; nuclear medicine, 14 mrem; consumer products, 10 mrem; occupational, 0.9 mrem; nuclear fuel cycle, <1 mrem; and fallout, <1 mrem).*

*Although a number of studies of cancer incidence in the vicinity of nuclear power facilities have been conducted, there are no studies to date that are accepted by the scientific community that show a correlation between radiation dose from nuclear power facilities and cancer incidence in the general public.*

- In 1990, at the request of Congress, the National Cancer Institute conducted a study of cancer mortality rates around 52 nuclear power plants and 10 other nuclear facilities. The study covered the period from 1950 to 1984, and evaluated the change in mortality rates before and during facility operations. The study concluded there was no evidence that nuclear facilities may be linked causally with excess deaths from leukemia or from other cancers in populations living nearby.*
- In June 2000, investigators from the University of Pittsburgh found no link between radiation released during the 1979 accident at Three Mile Island power plant and cancer*

deaths among nearby residents. Their study followed 32,000 people who lived within five miles of the plant at the time of the accident.

- *The Connecticut Academy of Sciences and Engineering, in January 2001, issued a report on a study around the Haddam Neck nuclear power plant in Connecticut and concluded radiation emissions were so low as to be negligible and found no meaningful associations to the cancers studied.*
- *The American Cancer Society in 2000 concluded that although reports about cancer clusters in some communities have raised public concern, studies show that clusters do not occur more often near nuclear plants than they do by chance elsewhere in the population. Likewise, there is no evidence that links strontium-90 with increases in breast cancer, prostate cancer, or childhood cancer rates. Radiation emissions from nuclear power plants are closely controlled and involve negligible levels of exposure for nearby communities.*
- *Also in 2001, the Florida Bureau of Environmental Epidemiology reviewed claims that there are striking increases in cancer rates in southeastern Florida counties caused by increased radiation exposures from nuclear power plants. However, using the same data to reconstruct the calculations, on which the claims were based, Florida officials were not able to identify unusually high rates of cancers in these counties compared with the rest of the state of Florida and the nation.*
- *In 2000, the Illinois Public Health Department compared childhood cancer statistics for counties with nuclear power plants to similar counties without nuclear plants and found no statistically significant difference.*

*There are three sources of strontium-90 in the environment: fallout from nuclear weapons testing, releases from the Chernobyl accident in the Ukraine, and releases from nuclear power reactors. The largest source of strontium-90 is from weapons testing fallout as a result of above-ground explosions of nuclear weapons (approximately 16.9 million curies of strontium-90). The Chernobyl accident released 216,000 curies of strontium-90. The total annual release of strontium-90 into the atmosphere from all U.S. nuclear power plants is typically 1/1,000th of 1 curie, which is so low that the only chance of detecting strontium-90 is sampling the nuclear power plant effluents themselves. Radioactive effluent releases are monitored at all nuclear power plants, and the results of the monitoring are reported annually to the NRC and are publically available on the NRC's website.*

*To ensure that U.S. nuclear power plants are operated safely, the NRC licenses the nuclear power plants to operate, licenses the plant operators, and establishes license conditions for the safe operation of each plant. The NRC provides continuous oversight of plants through its Reactor Oversight Process (ROP) to verify that they are being operated in accordance with NRC regulations. The NRC has full authority to take whatever action is necessary to protect public health and safety, and the environment and may demand immediate licensee actions, up to and including a plant shutdown.*

*In conclusion, the NRC staff will address the radiological impacts to human health during its evaluation of the Palo Verde license renewal application. The information will be contained in*

*Chapter 4 of the Palo Verde draft SEIS. The public will be offered the opportunity to comment on the NRC staff's findings in the SEIS.*

## **5. Comments Concerning Alternatives**

**Comment:** The U.S. Environmental Protection Agency (EPA) has reviewed the Federal Register Notice published on May 26, 2009, requesting comments on the Nuclear Regulatory Commission's (NRC's) Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process for Palo Verde Nuclear Generating Station, Units 1, 2, and 3 (Palo Verde). Our comments are provided pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality regulations (40 CFR Parts 1500-1508) and our NEPA review authority under Section 309 of the Clean Air Act.

EPA recognizes the difficulty of finding a viable alternative to an existing facility, such as Palo Verde, but we encourage you to consider a full range of alternatives. We recommend that NRC examine the most recent information available on renewable energy generation. The Bureau of Land Management and Department of Energy have prepared many documents that may be helpful, and are currently working on a Solar Energy Programmatic Environmental Impact Statement (<http://solareis.anl.gov/>). This effort is intended to facilitate utility scale solar energy development in selected solar energy zones in six western states, including Arizona. We also recommend the Draft Environmental Impact Statement (DEIS) discuss the feasibility of using residential and wholesale distributed renewable energy generation, in conjunction with increased energy efficiency, as a viable alternative in your analysis.

(PV-U-1)

**Comment:** Another aspect to renewable energy is that it lends itself to something that nuclear power cannot: decentralized power production. Therefore, the NRC needs to fully examine and analyze the economic impacts and reliability aspects of decentralized power vs. nuclear power when examining the relicensure of Palo Verde.

(PV-AB-8)

**Response:** *The comments are noted. NRC Staff will consider a wide variety of potential energy alternatives in Chapter 8 of the PVNGS SEIS.*

## **6. Comments Concerning Issues Outside the Scope of License Renewal: Support for License Renewal, Security and Terrorism, Emergency Response and Preparedness, Plant Performance, Energy Costs, and Other Out of Scope Issues**

**Comment:** Not much other than that I appreciate that Palo Verde is here and I want to keep it here. But then you said we won't get into a situation like they did out on Avondale where they built the plant and then they couldn't license it because of the evaluation maps were -- had the population blown at them and then the traffic passed the plant to get out. So we don't have that. And just that Palo Verde has had problems in the past, you know with safety compliance, but they've come up again with the help of the NRC and they changed management and they're doing great. So we'd just like to keep it that way. Thank you, very much.

(PV-B)

**Comment:** I'm Jack Herring and I've been in the area since the 1940s. I've seen a lot of changes here. And as far as the plant goes, they've been a good neighbor. And anytime there was ever anything going on out there that we needed to know, they always called us or let us know in some way. So with that I think it should remain here.

(PV-C)

**Comment:** Good evening. My name is Darah Mann and I'm the director of marketing and communications for WESTMARC. WESTMARC is an acronym for Western Maricopa Coalition, which is a broad-based coalition of the 15 communities in western Maricopa County which represent more than 35 percent of the county's population. Our membership consists of business, industry, government, education, human services, arts, and cultural organizations, chambers of commerce, and community leaders. Thank you for the opportunity to participate this evening.

WESTMARC would like to publically recognize the multiple significant areas of impact that Palo Verde has on our State. On our economy, by providing thousands of well paying jobs, by generating low-cost electricity, and by their status of being Arizona's largest taxpayer. On our environment, by generating clean energy for a metropolitan area that struggles to meet air quality standards. On our quality of life, by powering an unprecedented period of growth, by committing to safe and efficient operations.

Arizonans and others throughout the southwest would not enjoy such a high quality of life without the reliable electricity Palo Verde provides to power our businesses, our homes, and especially our air conditioners.

On behalf of WESTMARC, thank you for allowing me to express our continued appreciation for the valued contributions Palo Verde continues to provide our community.

(PV-E)

**Comment:** It's my new toy [referring to wheel chair]. Thank you for letting me speak tonight. I find Palo Verde especially poignant for me. I came to Goodyear in 1980, when we were in the throes of building Palo Verde and saw the economic contribution that just the building of the plant created. I've subsequently moved to a position with the Southwest Valley Chamber of Commerce. The Southwest Valley Chamber of Commerce is an organization that focuses on the business communities of Avondale, Goodyear, Litchfield Park, and Tolleson. We're a family proximately invested in the organization representing about 15 thousand employees.

I've been with the Chamber since 1984, so I indeed have had the opportunity to see the results of the operation of the plant.

And for those of you who have not been here, did not see the tremendous growth, you have to realize, I too, since 1984 did not expect to have the thousands of buildings and people living not in just this area, which of course Palo Verde supplies the perfect stage, but we need the energy, obviously (indiscernible). It is only when operations such as the power plant that we can supply our needs, especially in our peak season which you have the pleasure of joining us in.

I want to also recognize the Arizona Public Services for their responsible agent managing with

this particular plant. Their 25 hundred employees do make a significant impact economically. But I think more importantly is the contribution that the energy makes to the economic growth of our area. Without energy we could not continue our growth.

So I thank you very much for allowing me to address the issues and I thank you for being in our community tonight so that we can.

(PV-F)

**Comment:** Good evening. Welcome to the west valley. My name is Adolfo Gamez, I'm the Mayor of the city of Tolleson. And for the record, the city of Tolleson supports the license renewal of Palo Verde and we're a member of WESTMARC, and so the statements that they made on behalf of WESTMARC we echo.

(PV-G)

**Comment:** Good evening. My name is Glenn Hamer, I'm the president and CEO of the Arizona Chamber of Commerce and Industry. We're a statewide advocacy organization representing hundreds of companies across Arizona who employ about 250 thousand Arizonans. We're also served as the home to the Arizona Manufacturer's Council, which is -- we are the statewide affiliate for manufacturers for the National Association of Manufacturers. I just wanted to say that we strongly support this application. Nuclear power, in fact, in our 2009 business agenda we've identified nuclear power generation as a key goal. In fact, we've talked about the importance of removing obstacles to expanding nuclear power generation.

We strongly believe, for the State's economic health, that nuclear power must continue to play a major role in Arizona's energy net. That becomes all the more important given a number of the proposals closer to your home in Washington DC concerning climate change. It's unimaginable for us to think of a world where we didn't have a -- the very important State asset of Palo Verde. Again, the Arizona Chamber of Commerce and Industry, we strongly support continuation and this application and it's absolutely vital to the state's economic health.

Thank you for the chance to speak this evening.

(PV-I)

**Comment:** Good evening, Felipe Zubia. For the record, I'm here representing DMB Associates, developer and master plan developer for a community called Verrado, which is about 30 miles east of the facility.

And a little bit of history here. About ten years ago we embarked on the investment of this community, which is about 10 thousand acres, over 3000 homes.

And at the time, the property was being used as a Caterpillar proving ground, of course an appropriate use for the area at the time. However, we saw the area as much more than that, in fact partnered with Caterpillar to bring a master planned community that really is unrivaled in the west valley and frankly I'd put it up against any other community here in the State.

With that in mind, as we went through that process we reached out to all of our constituents in the area. Not only the Town of Buckeye and the surrounding communities but Luke Air force Base as well as Palo Verde.

At the time, we certainly wanted to assure all of our partners and constituents that we would be good neighbors; and in doing so, we received recommendations of support. We believe that we've upheld our commitment to be good neighbors. And in that same regard, we're here today to support APS, Pinnacle West, and the extension of the Palo Verde licensing process. They have been tremendously good neighbors. They have been a foundation of support and economic support for the area. And most importantly, they've been very responsive and reliable managers of the facility.

In fact, as the master plan developer of the community, we have a substantial investment not only in the built environment but in the cultural environment, and the natural environment that we have built up out there.

And we too hope that you look at the application very closely. We have a lot of people out there that certainly want to make sure that the process is done right.

But with that in mind we think that you'll find up and down the line from Palo Verde managers to APS to Pinnacle West; that you'll have responsive, reliable, and responsible management of the facility. So we look forward to the renewal process and the successful completion.

Thank you, very much.

(PV-J)

**Comment:** Good evening. Thank you for the opportunity to say a few words. Armando Contreras, the new president and CEO of the Arizona Hispanic Chamber of Commerce. The Chamber of Commerce certainly encourage and supports the relicensing process.

We -- here in the State, there are approximately 35 thousand Hispanic owned businesses just in Phoenix. We're encouraged with the continued development and safety that Palo Verde has offered to the community.

And we're also encouraged at the participation and embracement of the Hispanic minority women business and economic development that's been going on here. That has been really supported by Palo Verde and we want to continue that partnership and we hope that you continue towards these procuring opportunities that are out there for Hispanic businesses and all minority businesses in the State of Arizona.

Thank you, very much.

(PV-K)

**Comment:** Thank you. I apologize for being late, but I had another meeting that ended just now. My name is Jackie Meck and I reside at 225012 West Walcott, Buckeye, Arizona. Nuclear Regulatory Commission Members, thank you for allowing me to speak on behalf of the Palo Verde Nuclear Power Plant.

I am the Mayor of the Town of Buckeye with a population of around 45 thousand. We are located approximately 20 miles east of the power plant. In the 1970's I was on the Town Council for a period of nine years. The final three years, as Mayor, the Arizona Public Service managing partner of Palo Verde asked me, among others, to be on a community advisory committee. The committee functioned for approximately 10 to 12 years as I recall. During that time, we as committee members, were updated regularly as to the ongoing

construction and any problems that would arise from traffic, dust, or equipment. We were always kept up to date and made aware of any and all situations.

Since the beginning, they have provided funding for various community clubs, charities, and activities. Currently, as a member of the large area fund committee, which was funded by Arizona Public Service Palo Verde, the committee meets annually and it supports funding various groups such as schools and other opportunities to better our community. They have been partners and excellent neighbors to the Town of Buckeye for the past 30 years. In closing, they are committed to the community, not only with contributions in real dollars, but in employee volunteer service. They operate the plant efficiently, faithfully and continue to help Arizonans in inexpensive power. Palo Verde is Arizona's largest tax payer and a major employer. I would support them anywhere, anytime, especially at this point in time to continue their development of the next phase of the Palo Verde Nuclear Power Plant.

Thank you for allowing me to speak. And again I apologize for being late to my appointment.  
Thank you.  
(PV-L)

**Comment:** I am writing to request your board to uphold the standings of the Palo Verde Nuclear Generating Station in the review of all its units. Palo Verde matters greatly to the citizens of Goodyear. The plant provides the energy that fuels many homes in my city. Further, it provides clean, reliable energy to over four million people in the Southwest region. Arizona Public Service has worked diligently, along with NRC supervision, to ensure Palo Verde is a safe and efficient plant, and a model of America's nuclear energy team as the nation's largest energy provider. The plant employs over 2,500 people, many of those from Goodyear, and is Arizona's largest taxpayer. It makes economic sense to efficiently continue to run Palo Verde. As the Mayor of Goodyear, I strongly encourage you to renew the license for Palo Verde, to keep clean and reliable power coming to our homes, and to allow this fine example of America's nuclear power to function for years to come.  
(PV-M)

**Comment:** I am writing to your board to support the renewal application for the Palo Verde Nuclear Generating Station. As the largest nuclear power plant in America, Palo Verde is a symbol of Arizona's energy leadership and a welcome contributor to our energy infrastructure. Palo Verde supplies the clean and efficient power that keeps so many of our state's businesses in operation and homes well lit. With recent improvement made to the safety and management of the plant, I am confident in APS's ability to continue running Palo Verde reliably for many years more. As a major contributor to Phoenix and Southern California's power structure, Palo Verde holds a firm place in our two region's economies. Palo Verde is the baseline standard for pricing of energy here and helps keep costs low so that business owners can concentrate more on expanding and growing and less on the costs of operation like an expensive utility bill.

I can recall few times where the power has been out that it has not been swiftly restored. Thanks to the reliability of APS and Palo Verde, I have rarely had to worry about such a concern. As Arizona is facing one of the toughest economic climates in decades, losing the lower costs Palo Verde provides would be yet one more blow to business owners all over the region. I hope you will take my letter into consideration and find that renewing the license

application for Palo Verde is a smart decision for businessmen, homeowners and our entire state's economy.

(PV-N)

**Comment:** I am writing this letter to express my support for the renewal application of the Palo Verde Nuclear Generating Station. Palo Verde creates the clean, reliable and cost effective energy that my constituents in Legislative District 4 can rely on. The continued future of this generating station is important to all of us.

Benefits of the energy produced by Palo Verde directly impact the citizens I represent. An unwavering and low cost for energy can ease the strain experienced due to the current economic climate. Beyond the cost of energy consumption, my constituents expect the power coming to their homes to stay on throughout summer heat waves and desert monsoons. Palo Verde has been a part of that dependable service provided by APS.

APS has shown a long-term commitment to the development of the Palo Verde's location and wide range of service areas. The generating station is a major employer with more than 2,500 jobs and is one of Arizona's largest taxpayers. Support of Palo Verde makes strong economic sense, especially as it is the nation's largest power provider.

APS has shown its ability to safely and efficiently operate the generating station. With Palo Verde, the utility company has kept power bills low while ensuring environmental benefits such as clean air. I ask that you take my letter of support into consideration when reviewing the renewal of Palo Verde. I have confidence in APS and the plant to continue delivering clean, reliable and cost effective energy to my constituents' homes, for a very long time.

(PV-O)

**Comment:** I am writing in support of the renewal application for the Palo Verde Nuclear Generating Station. Palo Verde's contribution to the State of Arizona with clean, reliable, and cost effective energy is of great importance to members of the Home Builders Association of Central Arizona (HBACA).

As President and Executive Director of the HBACA, I am intimately familiar with the need for a steady and low cost energy supply to support Arizona's economic growth, which has been largely spurred by housing. Our homeowners expect reliable power that can be swiftly repaired when storms knock down lines, blow transformers or otherwise cause an interruption in service. APS and the power it provides with Palo Verde have always ensured this.

As the state's largest power provider, APS's ability to continue to operate the existing Units at Palo Verde makes strong economic sense. It makes sense for homeowners and for homebuilders. Losing the low-cost reliable energy provided by Palo Verde, in addition to the number of jobs it creates, would be a damaging blow to an already weak housing market in Arizona.

APS's strong management team has led the state in efforts to keep energy efficiency a major goal for customers, while continuing to provide energy that balances environmental and development concerns. The Palo Verde Station is an important part of the Arizona economy and a symbol of Arizona's commitment to delivering clean, reliable, and cost effective energy to

Arizona homeowners for decades to come. I urge your strong consideration in renewing Palo Verde's application.

(PV-P)

**Comment:** Palo Verde Nuclear Generating Station provides the power that keeps Arizona homes, businesses, our transportation system and our economy moving. When I learned of Palo Verde's renewal application, I wanted to take the opportunity to write in support of that application to the Nuclear Regulatory Commission. Arizona would simply not run as efficiently without this important power plant.

Palo Verde provides the clean, inexpensive and reliable energy that ensures not only homes around Arizona are powered, but the street lights and signs of their neighborhoods as well. As the former U.S. Secretary of Transportation and Director of the Arizona Department of Transportation, I know how crucial it is for our transportation systems to be efficient and dependable. Whether it is a school street sign or the Valley's newest light rail, power provided by Palo Verde ensures Arizona's transportation continues to operate smoothly.

Within recent years APS has renewed their efforts to make Palo Verde the safe and reliable plant it is today. One of the most important factors in powering any transportation system is reliability. Our transportation systems must be working at all times. I have confidence in APS to maintain that reliability with Palo Verde for decades to come and continue providing the low cost, efficient and reliable power that runs our systems.

It is both a strong economic and infrastructure decision to renew the license for Palo Verde Nuclear Generating Station. Losing the power provided by Palo Verde would be devastating for the state's infrastructure and cost a great deal of money in building additional plants to supplant the need. If you would like to speak with me further on why I believe Palo Verde is right for Arizona, please do not hesitate to contact me.

(PV-Q)

**Comment:** I am very pleased to highly recommend the renewal of the license for the Palo Verde Nuclear Power Facility which is situated just west of Phoenix. I am even more pleased to provide comments in support, of Arizona Public Service (APS) and its parent and affiliates who are the primary operators of this incredible facility, the largest nuclear power plant in the United States.

The facility itself appears to meet or exceed standards of safety, environmental regulations, security, operations, communications, and community integration. It has a history of operational excellence by a company and partnership that truly cares about: its employees and the community in which it serves. As with any community near a nuclear facility, we want to ensure that such an operation is the safest and most efficient of its kind. As the 5<sup>th</sup> largest city in the nation, that concern is manifold. That is why the most crucial element of the facility is the open and frequent communications that exists between its main operator, APS, and our city. APS is quick, meticulous, and thorough in responding to any questions or concerns which ever arise. They initiate contact with our authorities whenever any incident occurs or if there is even the appearance of any incident. That outstanding two-way communications is responsible for ensuring that facts are distinguished quickly from rumors and

that -all pertinent parties are kept regularly informed of any situation occurring at or near the plant.

In addition, Palo Verde was an active member of our statewide Domestic Preparedness Task Force which was in place years before the tragedy of 9-11. APS had the foresight, since its inception, to form public-private partnerships with our city's and state's leaders and managers including our vital public safety entities. That partnership has ensured that communications flows to all stakeholders and potentially affected persons/organizations on a regular basis and during any times of crisis. That joint effort includes training drills with police, fire, and other first responders, and there is a cooperative spirit that is second to none.

That partnership exists with the other productive operations of APS. As a geographic area which has peak energy demands in our summer months, APS has been responsive and aggressive in ensuring that power is preserved and available for the homes and businesses of our residents which is crucial for our economic, educational, public safety, and business climate.

APS is a company of which you can be very proud. We certainly are. I have known the top leaders of this company over the past 20 years. Each one has understood the tremendous responsibilities of the company and the nuclear power facility and have lived up to the obligations for producing a safe environment for both employees and residents.

APS is very involved in our community in more ways than providing power and energy. The company's contributions have been essential to our social and economic well-being. It is hard to find a cause or an element of quality of life in our Valley in which APS has not been involved. Its personnel have been leaders in improving elements of transportation, education, the environment, health care, and public safety. Its employees serve on numerous non-profit and civic organizations and serve as valuable appointees on various public boards and commissions which affect public policy. The awards received by the company and its employees are too numerous to mention. They are true community partners, and this Mayor is very grateful for their endless contributions to our city, our Valley, our state, and our nation. If there is any additional information you need or if you have any questions, please do not hesitate to contact me.  
(PV-S)

**Comment:** I am writing to express my support for Palo Verde Nuclear Generating Station during its upcoming review by the U.S. Nuclear Regulatory Commission (NRC). For roughly 20 years Palo Verde has been operating safely and efficiently as the largest station of its kind.

Many of my constituents in Arizona, Legislative District 4 have always relied on the trustworthy service provided by APS. Palo Verde has secured its reputation as an area point of pride, in part because of the effort by APS and yourselves, the NRC, to ensure Palo Verde runs safely under national rules and regulations. The safety and efficiency of the plant stands out and has created a model which nuclear energy can be judged.

Electricity costs are certainly a consideration for many businesses and homeowners relocating all over Arizona, including LD4. Palo Verde has been an important generator of low and steady energy costs in Arizona. My constituents and their potential new neighbors care about the clean efforts of APS with plants such as Palo Verde, which keep the bottom lines on their electric bills low.

Palo Verde provides energy around the southwest and can continue to support Arizona economically and safely. I strongly believe APS will continue to run Palo Verde to the highest standards and provide Arizona with clean, reliable energy for years more to come.

(PV-T)

**Comment:** I would like to advise you about how important the Palo Verde Nuclear Generating Station is to Buckeye and to Arizona. Palo Verde's contribution to the state of Arizona, with clean, reliable and cost effective energy is well appreciated by everyone at the Buckeye Valley Chamber of Commerce. It is a vital resource not only for its energy supply, but on a broader scale. Palo Verde affects Arizona's entire economy.

As the President/CEO of the Buckeye Valley Chamber of Commerce, I understand the benefits of a steady and lower cost energy supply. It is always a chief concern economically and, often times affects how businesses and families in Buckeye spend their money, especially in the hot summers. In accordance, APS and the power it provides with Palo Verde have always striven to create clean, cost- sensitive energy, while continuing to provide important environmental benefits.

Continuing the operation of Palo Verde makes strong economic sense for Buckeye, for Arizona and for other locations across the Southwest. Losing the low-cost reliable energy provided to over four million people by Palo Verde, in addition to the over 2,500 jobs it creates would be another damaging blow to Arizona's economic standing.

Palo Verde is a local point of pride for all of us in Buckeye and our neighbors. My request is simple, that you take my letter of support into consideration when reviewing the re-licensing of Palo Verde and its current units. I hope you will come to the same conclusion I have.

(PV-V)

**Comment:** I write to you in full support of the renewal application of the Palo Verde Nuclear Generating Station. Arizona Public Service (APS) has safely and efficiently operated the plant for years, allowing PV to make long-term contributions to local area development. My constituents in Arizona Legislative District, 25 are some of those persons directly benefitting from Palo Verde's presence. The generating station is a major area business, employing more than 2,500 individuals.

Clean, reliable and cost effective energy is important now more than ever. The electricity generated by Palo Verde is something which my constituents in Legislative District 25 and our fellow citizens nationwide can rely on. Benefits of the energy produced by Palo Verde directly impact more than four million people throughout the Southwest. More than half of those live in the state of Arizona.

Not only does Palo Verde provide for millions, it ensures the light will turn on when our fellow citizens flip the switch. APS stands for dependable service, while at the same time keeping power bills low and taking important environmental considerations. I believe APS and Palo Verde will continue to deliver, clean, reliable and cost effective, energy to Arizona homes for decades, and I ask you to keep Palo Verde in operation.

(PV-W)

**Comment:** I am contacting you to lend my support to the Palo Verde Nuclear Generating Station and the review for continued operation. Palo Verde has a tremendous positive impact for my constituents in Arizona Legislative District 4 by providing clean, reliable and low-cost energy. In these troubling economic times, that low-cost energy is especially important for my constituents. Families around the Valley are pinching pennies wherever they can and simply struggling to get by. Where they might once have been wondering what expenditures they could afford, now they are troubled simply trying to keep the lights on. Palo Verde keeps their energy costs lower than alternative measures, and helps ensure they are able to light their homes.

That reliable and low cost energy is just as important to businesses as it is to homeowners. With larger utility expense costs, the difference Palo Verde makes for many businesses can be great. In addition, the reliability of the power supplied by APS ensures that businesses are never closed due to a failing energy infrastructure. This is extremely attractive for new businesses looking to locate to Arizona.

I am proud to have Palo Verde, the largest nuclear generating station in America, right here in Arizona. It is a symbol of Arizona's growing potential within the U.S. market and a welcome addition to our family. It is my sincere wish that you approve Palo Verde's request for continued operation.

(PV-X)

**Comment:** The Greater Phoenix Chamber of Commerce has been following with great interest the Nuclear Regulatory Commission's license renewal process for the Palo Verde Nuclear Generating Station. Palo Verde plays an important role in meeting the tremendous energy requirements of a fast growing state. For decades, it has done so in a safe and efficient manner, while also reducing our dependence on foreign oil and the production of green house gasses. In my role as President and CEO of the Greater Phoenix Chamber of Commerce, I understand how much our economy depends on the reliable delivery of power to keep Arizona working. As you most certainly are aware, losing power, even for a short period of time, can result in the loss of millions of dollars for our businesses large and small. APS and Palo Verde have a strong track record of delivering the consistent, reliable and cost effective energy that Arizona businesses need to succeed.

Palo Verde is also Arizona's biggest single tax payer. At a time when our state faces the largest budget deficit in the country (as a percentage of the total budget) losing such a major contributor will result in the loss of millions to the state's General Fund, local communities and our schools. From an economic development perspective, a significant number of businesses in the Phoenix metropolitan area operate around the direct or indirect needs of the plant, and would suffer greatly in the event of a non-renewal.

The Greater Phoenix Chamber of Commerce stands squarely behind APS in its license renewal bid. I hope you will consider my letter in your review and strongly take into account the contributions Palo Verde makes to our economy and our state.

(PV-Y)

**Response:** *The comments are noted. The comments are supportive of APS and license*

*renewal at PVNGS, and are general in nature. The comments provide no new information and will not be evaluated further.*

**Comment:** The second large issue, Arizona's nuclear dump. With Yucca Mountain apparently out of the picture, Palo Verde is really a huge defacto nuclear waste dump.

And in 20 more years increases its waste on site by 50 percent even if they're in dry casks, while continuing the added risk of cooling pools for a total of 60 years.

The question is, can this facility handle this securely and reliably?

(PV-D-2)

**Comment:** And wasn't it unrealistic, if not the height of arrogance, for a species that has only a few thousand years of recorded history to plan on safely managing radioactive waste for a minimum of 100 thousand years?

Thank you.

(PV-D-10)

**Response:** *The staff notes that on March 3, 2010, DOE submitted a motion to the Atomic Safety and Licensing Board to withdraw with prejudice its application for a permanent geologic repository at Yucca Mountain, Nevada. Nevertheless, the safety and environmental effects of spent fuel storage have been evaluated by the NRC and, as set forth in the Waste Confidence Rule (10 CFR 51.23), the NRC generically determined that such storage could be accomplished without significant environmental impacts. In the Waste Confidence Rule, the Commission determined that spent fuel can be safely stored onsite for at least 30 years beyond the plants life, including license renewal. In 10 CFR Part 51, on site spent fuel storage is classified as a Category 1 issue that is applicable to all nuclear power plant sites. While the Commission did not assign a single level of significance (i.e., Small, Moderate, or Large) in Table B-1 of Appendix B to Subpart A to Part 51 for the impacts associated with spent fuel and high level waste disposal, it did conclude that the impacts are acceptable in that these impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR Part 54 should be eliminated.*

*The GEIS for license renewal (NUREG-1437) evaluated a variety of spent fuel and waste storage scenarios, including on site storage of these materials for up to 30 years following expiration of the operating license, transfer of these materials to a different plant, and transfer of these materials to an Independent Spent Fuel Storage Installation (ISFSI). During dry cask storage and transportation, spent nuclear fuel must be "encased" in NRC-approved casks. An NRC-approved cask is one that has undergone a technical review of its safety aspects and been found to meet all of the NRC's requirements. These requirements are specified in 10 CFR Part 72 for storage casks and 10 CFR Part 71 for transportation casks. For each potential scenario involving spent fuel, the GEIS determined that existing regulatory requirements, operating practices, and radiological monitoring programs were sufficient to ensure that impacts resulting from spent fuel and waste storage practices during the term of a renewed operating license would be small, and is a Category 1 issue.*

*The comments provide no new and significant information and, therefore, will not be evaluated further.*

**Comment:** If we want a dump at this site, off-site from Palo Verde for the dump, it raises other questions. If a waste disposal site actually becomes available, will that put shipments of highly radioactive wastes on the Interstate 10 near the facility? And what are the potential impacts to transportation and other economic costs associated with such a contingency?

As a person with over a decade of emergency planning experience, I'm aware of the many disaster drills at Palo Verde, but I don't believe there has ever been an exercise or plan involving a worst case scenario of a spill of nuclear waste from Palo Verde or a terror attack on a shipment that causes the release of nuclear waste into the environment.

I did see information about a worst case scenario of a nuclear waste spill along Interstate 40. I attended that State Emergency Response Initiative where we discussed it.

According to their estimates it would take about 15 months to decontaminate to safe levels. Further, if the roads to or from Palo Verde are closed for an extended period of time due to a radioactive spill; would that give terrorists an advantage? Would such a scenario impede response and/or defense?

(PV-D-3)

**Comment:** The number one concern of American citizens about nuclear power plants is the threat of a terrorist attack on a nuclear power plant, whether by foreign or domestic terrorists. All possible terrorist scenarios regarding Palo Verde need to be examined, along with potential impacts and mitigation, including scenarios where there is a significant population residing near Palo Verde (within ten miles), per NEPA requirements. There have been train derailments caused by someone unknown tampering with the rail lines, a form of domestic terrorism, in western Maricopa County, that still have never been solved. So there is already a history of suspicious actions and concerns about the ability of authorities to prevent these incidents, monitor for them, or prevent them. These incidents indicate a continuing vulnerability to terrorist acts, and should be reviewed as part of the terrorism analysis performed under NEPA.  
(PV-AB-2)

**Response:** *The NRC's environmental review is confined to environmental matters relevant to the extended period of operation requested by the applicant. Appropriate safeguards and security measures have been incorporated into the site security and emergency preparedness plans. Any required changes to emergency and safeguards contingency plans related to terrorist events will be incorporated and reviewed under the operating license. Security issues such as safeguards planning are not tied to license renewal, but are considered to be issues that need to be dealt with constantly as a part of the current operating licenses. Security issues are periodically reviewed and updated at every operating plant. These reviews will continue throughout the period of any extended license. When issues related to security are discovered at a nuclear plant, they are addressed immediately, and any necessary changes reviewed and incorporated under the operating license. Such changes are not postponed until the period of extended operation.*

*The comments provide no new information and do not pertain to the scope of license renewal under 10 CFR Part 51 and 54. Therefore, the comments will not be evaluated further.*

**Comment:** Please consider and address the following questions: What would the torque be for a full Boeing 747 hitting the generator building at different points of the building, such as the middle point of the generator building, at the point that is connected to the reactor containment building RCB, at the point 25% of the way from the RCB toward the end of the generator building, at the 75% point, all assuming a maximum speed for the aircraft and at a perpendicular strike directly against the generator building?

Is the generator building and the heat transfer area around the primary coolant loops and secondary generator loops strong enough to withstand this impact without a coolant breach?

We know that the RCB is not strong enough for the most powerful strike, as this has been admitted in NRC proceedings. What is the likelihood of a full impact strike causing a meltdown?

Please consider the attached Greenpeace study, *New Nukes and Old Radioactive Waste* in these deliberations and analysis. (P\_@\_SEJ\_2006\_Final\_Draft).  
(PV-AB-4)

**Response:** *The NRC believes that the best approach to dealing with threats from aircraft is through strengthening airport and airline security measures. Consequently, the NRC continues to work closely with the appropriate Federal agencies to enhance aviation security and thereby the security of nuclear power plants and other NRC-licensed facilities. Shortly after the September 11, 2001 attacks, NRC, working with representatives of the Federal Aviation Administration (FAA) and Department of Defense (DOD), determined that a Notice to Airmen (NOTAM), issued by the FAA, was the appropriate vehicle to protect the airspace above sensitive sites. This NOTAM strongly urged pilots to not circle or loiter over the following sites: nuclear/electrical power plants, power distribution stations, dams, reservoirs, refineries, or military installations.*

*Physically shielding (i.e., airplane-resistant cover) vital nuclear or non-nuclear installations from attacks by large aircraft being used as missiles is not the approach adopted by the Federal government to protect the nation. With respect to potential terrorist attacks by air, Federal government efforts have increased substantially since September 11, 2001. Those efforts include enhanced airline passenger and baggage screening, strengthened cockpit doors, and the Federal Air Marshals program, among others. Federal law enforcement and intelligence agencies have increased efforts to identify and mitigate potential aircraft-related threats before they can be carried out. In more than one case, the DOD and FAA have acted to protect airspace above nuclear power plants in response to threats at the time thought to be credible but which were later determined to be non-credible. These and other government-wide efforts have improved protection against air attacks on all industrial facilities, both nuclear and non-nuclear.*

*In summary, the NRC, other agencies of the Federal government, the local governments, and the licensees have taken comprehensive and in-depth actions to enhance NRC's defense-in-depth philosophy, including against air attacks. These actions have resulted in significant improvement of nuclear plant security.*

*The NRC's environmental review is confined to environmental matters relevant to the extended period of operation requested by the applicant. Appropriate safeguards and security measures have been incorporated into the site security and emergency preparedness plans. Any required*

*changes to emergency and safeguards contingency plans related to terrorist events will be incorporated and reviewed under the operating license. The comments provide no new information and do not pertain to the scope of license renewal under 10 CFR Part 51 and 54. The comment will not be evaluated further.*

**Comment:** Next issue, population growth and contingency issues. There are plans for a large development near Palo Verde bringing in at this point about 140 thousand people. The current contingency plan is to evacuate within a ten mile radius and then wait for federal assistance. A footnote, we might want to ask the people of New Orleans what they think about the folly of that plan.

To move such a large population away from the ten mile radius in a timely manner, when time would be so much of the essence in a situation like that, would require enormous resources including legions of buses that would in themselves become contaminated during the evacuation and would need, of course, much more detailed decontamination afterwards if they were ever going to be put back into service. It's doubtful that anyone would ever want to ride them nonetheless.

It's also doubtful that buses pulled from normal service for such an evaluation would be able to arrive here in a timely manner. I don't think there are enough buses in the Phoenix metro area that could move those -- that could move that number of people and of course it's easily more than an hour away. Again, time is of the essence.

It would seem to me that in order to be properly prepared the requisite number of buses would have to be ready and in the immediate vicinity of Palo Verde. Where will they be stored? Who will maintain them? Who will be ready to drive them in the case of something happening?  
(PV-D-4)

**Comment:** The current contingency plan is to evacuate people within a ten mile radius and then wait for federal assistance. The strategy for moving hundreds of thousands of people away quickly and perhaps permanently needs to be examined and laid out, as well as any mitigation that could be implemented.  
(PV-AB-3)

**Response:** *The Commission considered the need for a review of emergency planning issues in the context of license renewal during its rulemaking proceedings on 10 CFR Part 54, which included public notice and comment. As discussed in the Statement of Considerations of a 1991 rulemaking (56 FR 64943 at 64966-7) and reaffirmed in a 1995 rulemaking (60 FR 22461 at 22468), the programs for emergency preparedness at nuclear plants apply to all nuclear power plant licensees and require the specified levels of protection for each licensee regardless of plant design, construction, or license date. Requirements related to emergency planning are in the regulations at 10 CFR 50.47 and Appendix E to 10 CFR Part 50. These requirements apply to all operating licenses and will continue to apply to plants with renewed licenses. Through its standards and required exercises, the Commission reviews existing emergency preparedness plans throughout the life of any plant, keeping up with changing demographics and other site-related factors. Therefore, the Commission has determined that there is no need for a special review of emergency planning issues in the context of an environmental review for license renewal.*

**Comment:** The next issue I call "Trust Us." The Palo Verde reactors are only now, after an unprecedented length of time, being moved off of the multiple repetitive degraded corner stone column, an extreme level of NRC oversight. Can these people really be trusted?

The NRC decided for years that the culture of management at Palo Verde was such a huge problem that it closely scrutinized the plant and was on the brink of closing the facility. Suddenly, after five years the NRC decided everything is suddenly okay. That sounds much more like a political decision than something that's reality based. And we are left wondering if Palo Verde operators might have just straightened up their act just long enough to get their license reviewed with plans to backslide or did they really, finally get their act together? What assurances do we have that future violations and noncompliance will be detected and dealt with early enough? The nuclear industry is admittedly only one big accident away from a total collapse. So this makes us wonder, is it time to double down at this facility?  
(PV-D-5)

**Comment:** The next issue is what they call the "Bathtub Curve." Complex engineering projects have most problems at the beginning and the ends of their lifecycle.

The bathtub curve is widely used in reliability engineering, although the general concept is also applicable to humans, it describes a particular form of the hazard function, which comprises three parts: The first part is a decreasing failure rate, known as early failures. The second part is a constant failure rate, known as random failures. And the third part is an increasing failure rate, known as wear—out failures. The name is derived from the cross—sectional shape of the eponymous device.

The bathtub curve is generated by mapping the rate of early infant mortality failures. When first introduced the rate of random failures with constant failure rate during its useful life, and finally the rate of wear—out failures as the product exceeds its design.

It is especially concerning as there are plant aging and radiation embrittlement issues for reactors and their associated equipment. My bet is that nobody really knows a lot of what will be happening to the metals after 30 to 40 to 60 years of radioactive bombardment. Considering the previous and serious problems at Palo Verde already with leaking pipes and all the other issues there, will NRC require and monitor the requisite inspections to prevent another problem and outage?  
(PV-D-6)

**Comment:** The next issue I call "New Crew." As reactors get older the crews that run them didn't build them and likely haven't looked at the original plans even once in their lives. How good is the institutional memory of Palo Verde, given that they've had such significant problems in the past? We'll have a new generation of employees. What training programs will be in place to assure that this doesn't cause problems? There is already a critical shortage of trained workers for the nuclear technology.  
(PV-D-7)

**Response:** *Plant performance is part of the current operating license. To ensure that U.S. nuclear power plants are operated safely, the NRC licenses the nuclear power plants to operate, licenses the plant operators, and establishes license conditions for the safe operation of each plant. The NRC provides continuous oversight of plants through its Reactor Oversight Process (ROP) to verify that they are being operated in accordance with NRC regulations.*

*The NRC has full authority to take whatever action is necessary to protect public health and safety, and the environment and may demand immediate licensee actions, up to and including a plant shutdown.*

*The NRC's environmental review is confined to environmental matters relevant to the extended period of operation requested by the applicant. The NRC will ensure that the safety of a currently operating power plant will continue to be maintained before renewing the license by ensuring that aging effects will be adequately managed and that the licensing basis related to the present plant design and operation will be maintained. Before a new license is issued, the NRC will ensure that there is a technically credible and legally sufficient basis for granting a new license for an extended 20 years as reflected in the NRC's safety evaluation report (SER), final SEIS, and the proposed new license. The comment provides no new information, and does not pertain to the scope of license renewal under 10 CFR Part 51 and Part 54. Therefore, it will not be evaluated further.*

**Comment:** Below are DWAZ's questions, with an article of Moody's downgrading SC Electric and Gas due to their participation in a nuke. Moody's has said that it would be downgrading utilities participating in nuclear energy projects. Moody's study and a recent follow-up are attached for inclusion and reference. Fitch also downgraded this utility a while back, and the article is below the first one.

DWAZ includes the attached by reference: "Special Comment, Moody's Corporate Finance--New Nuclear Generating Capacity: Potential Credit Implications for U. S. Investor Owned Utilities," May 2008, at

<http://massimobray.italianieuropei.it/080527MoodysNewNukeGenCapacity.pdf>

DWAZ's questions include:

In relation to the "Special Comment, Moody's Global Infrastructure Finance--New Nuclear Generation: Ratings Pressure Increasing," June 2009.

Q: This report says, "History gives us reason to be concerned about possible balance-sheet challenges, the lack of tangible efforts today to defend the existing ratings, and the substantial execution risk involved in building new nuclear power facilities."

While this report largely deals with new reactors, it is true that older reactors are having major components replaced, like heat exchangers, plumbing and electrical infrastructure, generators, and condensers, etc. Some of these are beyond "variable operating cost" and are capital investments, capitalized on the balance sheet. Similar to when an old company truck gets too old and the repairs and capital improvements outweigh the cost of payments on a new one, when reactors get older, this at some point will happen. When that does happen, what are the risks that could down-grade APS/PVNGS ratings with firms like Moody's Standard and Poor's and Fitch ratings companies?

Q: What are the major component and infrastructure replacements that PVNGS has had so far that have been capitalized?

Q: Are is the NRC learning from the collective experience of other reactors in the U.S. and their major component and infrastructure replacements?

Q: What are the costs of capitalized major component and infrastructure replacements for other reactors in the U.S., and how does PVNGS compare?

Q: One of the Browns Ferry reactors had a fire many years ago, and this fire knocked out the reactor from producing electricity for decades. When the reactor was refurbished, the total cost was about \$1.5 billion. Does APS see how this kind of repair/renovation could have a significant impact on corporate risk levels and on ratings by credit ratings agencies like Moody's? Could APS financially handle such a contingency and survive without bankruptcy, or would APS just stick ratepayers with the bill again?

Q: In another case, at the Davis-Besse in Ohio, the reactor came a few months away from a corrosion-caused breach of containment. Does APS or ANPP realize that there are possible major repairs that may make an old plant a large previously un-booked liability?

Q: What are the costs of increased variable operation and maintenance of U.S. reactors as reactors have aged, for reactors, per reactor, over 15 years old, over 20 years old, over 25 years old, over 30 years old and over 35 years old?

Q: What are the costs of capitalized major component and infrastructure replacements of all U.S. reactors, per reactor, as reactors have aged, for reactors over 15 years old, over 20 years old, over 25 years old, over 30 years old and over 35 years old?

Q: What depreciation duration was used for these capitalization schedules for income tax purposes for each U.S. reactor per incident of capitalization?

Q: This reports says, "We also believe companies will ultimately revise their corporate-finance policies to begin materially strengthening balance sheets and bolstering available liquidity capacity at the start of the construction cycle." To the degree that there can be breakdowns and capitalized major component and infrastructure replacements with significant economic value at any time, what are Arizona Public Service and other members of the Arizona Nuclear Power Project doing in terms of "strengthening their balance sheets and bolstering available liquidity capacity"?

Q: What are APS and ANPP target reserve margins, by year, for 2009 and for future years through the proposed extended lifespan of PVNGS?

Q: What have the target reserve margins been for the years since PVNGS Unit 1 has been in operation?

Q: What have the actual reserve margins been for APS and ANPP for the low point of each year since PVNGS Unit 1 has been in operation?

Q: To what degree are APS and the other partners of ANPP counting on PVNGS in its total relied-upon capacity and as part of the calculate reserve capacity?

Q: As PVNGS reactors go down because of increased interruptions in service due to age, is APS and ANPP increasing its reserve margin to cover this decrease in reliability?

Q: If so, by what megawattage and percentage of total power design electrical rating plant capacity, for APS and ANPP?

Q: The report says, "Historical rating actions have been unfavorable for issuers seeing to build new nuclear generation. Of the 48 issuers that we evaluated during the last nuclear building cycle (roughly 1965-1995), two received ratings upgrades, six went unchanged, and 40 had downgrades. Moreover, the average downgraded issuer fell four notches. All these ratings were evaluated on the senior secured or first mortgage bond ratings." While these are for new builds, major capitalization may be required numerous times for aging reactors during their last 2-3 decades of operation. Have APS and ANPP members prepared for the possibility of downgrades by the ratings agencies due to large capital outlays?

Q: The report says, "We view new nuclear generation plans as a 'bet the farm' endeavor for most companies. . ." While they are referring to long construction timelines, there may be lengthy repair timelines at PVNGS. What are APS and ANPP doing to brace for possible extended capital repairs of PVNGS Units 1-3, in terms of bolstering financial health and in terms of increasing reserve margins?

Q: Please provide a list of all capitalized component and infrastructure investments for PVNGS year by year and component by component and infrastructure investment by investment, since the initial power-up at each reactor.

Q: Please give projections for what the cost of similar investments will be, item by item, in the future. For example, for a generator replacement done in the past, what is the projection on cost to do replace a generator in the future, year by year through the proposed license extension period?

Q: The report says that APS moved down 4 notches from 1981-1993, with a beginning rating of A2 FMB with the lowest rating at Baa3. If there is to be an extended period of repair/construction in the future for any of the Units 1-3, say for 1, 2, 3, or 4 years, what ratings downgrade might happen?

Q: If there is a Moody's rating downgrade of 1, 2, 3 or 4 levels, what impact on interest rates for new plant construction and major capitalized repair debt will occur, in percentage increases?

Q: What are APS and ANPP doing to improve their respective credit ratios in anticipation of such component replacements or capitalized infrastructure repair possibilities?

Q: The reports says, "The likelihood that Moody's will take a more negative rating position for most issuers actively seeking to build new nuclear generation is increasing. With only about 24 months remaining before the NRC begins issuing licenses for new projects and major investment begins, few of the issuers we currently rate have taken any meaningful steps to

strengthen their balance sheets. Considering these new projects tend to raise an issuer's business and operating risk profiles, the utility's overall credit profile appears weaker." Again, with increases in major repairs as reactors get older, and with increasing dollar amounts for repairs, what are APS and ANPP doing to minimize their risks and to keep from getting downgraded by the ratings agencies?

### **SCANA feels rating bite on nuclear plant**

Wednesday, July 15, 2009

Moody's Investor Services lowered SCANA Corp.'s bond rating this week and listed the outlook as negative because of the S.C. utility's joint ownership of a \$12 billion nuclear project under construction. Moody's warned investors two weeks ago that it was likely to take a negative view on nuclear development by power companies. Some in the nuclear industry have taken issue with that policy. But Moody's stood by it when explaining its decision on SCANA.

"We remain concerned with the ... risks associated with a project of this magnitude for a company of this size," said Moody's Senior Vice President Jim Hempstead.

SCANA subsidiary S.C. Electric & Gas is expanding the V.C. Summer Nuclear Station with Santee Cooper. The power companies are adding two AP100 nuclear reactors at the existing nuclear plant.

**Comment:** The life cycle of nuclear power is not only dependent upon fossil fuels for the production of uranium fuel, decommissioning, and the disposition of wastes generated: it is also dependent upon a grid that is powered by other sources of energy, typically coal. This is due to the simple fact that nuclear reactors cannot "black start"—in other words, they depend on electric power from the external power grid to be able to come on-line. Transition away from the combustion of fossil fuels cannot be accomplished solely by the expansion of nuclear power since it depends on the grid being powered up before reactors can come on-line.

Other studies on the economics of nuclear power generation that should be reviewed and considered in the NEPA analysis are at: <http://www.greenpeace.org/raw/content/usa/press-center/reports4/the-economics-of-nuclear-power.pdf>

[http://www.earth-policy.org/Updates/2008/Update78\\_printable.htm](http://www.earth-policy.org/Updates/2008/Update78_printable.htm)

Amory Lovins:

<http://www.rmi.org/sitepages/pid467.php>

[http://www.arizonapirg.org/uploads/ee/qD/eeqDk\\_cKZYH5yuhZduZTA/The-High-Cost-of-Nuclear-Power.pdf](http://www.arizonapirg.org/uploads/ee/qD/eeqDk_cKZYH5yuhZduZTA/The-High-Cost-of-Nuclear-Power.pdf)

<http://www.stanford.edu/group/efmh/jacobson/EnergyEnvRev0908.pdf>

Also see the attached file, the copy of SEA Energy Costs.  
(PV-AB-6)

**Comment:** The attached study says on page 296, that a 2000 study says every \$1.4 million yields 11.3 to 13.5 full-time equivalent jobs. This study should be used in the economic analysis comparing the economic benefits of the relicensing of Palo Verde vs. expending resources to get an equivalent amount of generating power from solar, wind, and other renewables. The total

number of jobs (FTE) at Palo Verde Nuclear Generating Station (PVNGS) and the total revenue is for PVNGS' electricity should be determined, and dividing the latter by the former will yield dollars/job at PVNGS. The attached study will provide much useful information re the dollars/job of renewable energy options.

(PV-AC)

**Comment:** A recent study by an economic analyst at the University of Vermont finds that building 100 new reactors would cost from \$1.9 to \$4.1 trillion more than getting our electricity from clean renewable energy sources. (See

[http://www.nirs.org/neconomics/cooperreport\\_neconomics062009.pdf](http://www.nirs.org/neconomics/cooperreport_neconomics062009.pdf))

All costs and impacts of energy efficiency programs, alternative and renewable energy sources should be examined against the costs and impacts of relicensing Palo Verde. This analysis should also include water usage, air pollution impacts (Palo Verde has been fined significantly by the Maricopa County Air Quality Department for exceedances of its particulate matter (PM) emissions limits, specifically for excess PM emissions from its cooling towers.), wastes, radioactive emissions, mining impacts and groundwater impacts of uranium mining, sustainability, and the costs in terms of money and of carbon of developing less rich ores for reactor fuel, including the rising costs of the electricity used in the process of making fuel rods, which includes enrichment and fuel processing. The uranium enrichment plant at Paducah, Kentucky is the largest U.S. emitter of CFCs, which destroy the ozone layer.

The average energy efficiency cost for State programs across the U.S. is 3-4 cents per KWH. The average cost of just nuclear fuel, O&M (fixed and variable) is at least 3.7 cents and at most 4.9 cents per KWH, according to the Keystone report. (See page 42 of referenced Keystone report [http://www.ne.doe.gov/pdfFiles/rpt\\_KeystoneReportNuclearPowerJointFactFinding\\_2007.pdf](http://www.ne.doe.gov/pdfFiles/rpt_KeystoneReportNuclearPowerJointFactFinding_2007.pdf).) The Keystone report was hailed by Nuclear Engineering International and it was a multidisciplinary report. This averages higher than the average efficiency cost.

A fundamental element in finding that nuclear power is a false solution to climate change is that the economics of nuclear power are not sound – in open markets nuclear cannot compete. Since splitting atoms is not a cost-effective source of electric power, it is even less cost-effective in preventing greenhouse gas emissions. Life cycle costs for nuclear power generation (in the USA) have been estimated at 12 cents a kilowatt hour; whereas life cycle costs for wind power in the same analysis is estimated at 4 cents a kilowatt hour. Others find that expanding nuclear generating capacity is about twice as expensive as expanding generating capacity through investment in wind power. Since the same money will buy 2 – 3 times more electric power when used to purchase wind generated electric power, it is clear that prevention of greenhouse emissions will also be 2 – 3 times greater when buying wind generated electricity than nuclear generated electricity (as opposed to nuclear generating capacity). CO<sub>2</sub> production per dollar is not constant. According to the Sovacool study, the average study which passed the test for quality projects that nuclear power will produce 66 grams of CO<sub>2</sub>/kilowatt- hour, and that wind's life cycle will produce 10 grams. CO<sub>2</sub> output is related to KWH, not cost per kilowatt- hour, partly because cost is a fluctuating value, but a KWH is a fixed scientific measurement. Therefore, nuclear power will produce 66 grams CO<sub>2</sub>/KWH and wind 10 grams, which is 6.6 times the pollution output of CO<sub>2</sub>. If we can assume that wind is half the price per KWH, then the output becomes 13.2 times the CO<sub>2</sub> output per nuclear power compared to wind. However, it is important to note that all the studies reviewed by Sovacool only assume the current ore

grade of uranium to continue into the future. We know that ore grades will decline, as they have already halved over the last 30 years from 3000 ppm to 1500 ppm. The Sovacool report also does not assume any CO2 for long-term waste management and remediation, including unintentional and intentional terrorist environmental breaches.

The average cost should include all costs, including transmission & distribution. DWAZ estimates that the cost of new nuke energy will be about 24 cents/KWH (18 cents for generation plus 7 cents for T&D), wind with T&D is 15 cents on average, and energy efficiency is 3.5. The Cooper and other reports are in the same ballpark on nuclear power. (PV-AB-5)

**Comment:** The following was provided as an attachment to an email (PV-AA).

## Solar Photovoltaic Costs for Life of System

Spreadsheet by Russell Lowes, www.SafeEnergyAnalyst.org, 3/5/09 DRAFT

Energy Production Assumptions			Utility	
Residential	Residential	Residential	Industrial	
Based on Construction Cost Given By Solon at 2/12 Tour	Based on Typical Construction Cost Locally	Based on 50% rebate from Gov't & Utilities	Based on Lower Cost Industrial w/ Higher 12% Charge Rate	
1	1	1	1	Kilowatt
8766	8766	8766	8766	hours per year
30.0%	30.0%	30.0%	30.0%	capacity factor (percentage of maximum nameplate rating realized in kilowatt-hours)
25	25	25	25	Lifespan; years of production of electricity
65745	65745	65745	65745	Subtotal
10.0%	10.0%	10.0%	10.0%	average degradation over 25 year lifespan, based on Solon guarantee of kilowatt-hours production for lifespan
59170.5	59170.5	59170.5	59170.5	
<b>Cost Assumptions</b>				
\$4,000.00	\$12,000.00	\$6,000.00	\$4,000.00	Dollars per kilowatt of e capacity, A/C
\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	Repairs and Maintenance over 25 year lifespan (GENERAL ESTIMATE)
\$5,000.00	\$13,000.00	\$7,000.00	\$5,000.00	Total investment over lifespan
Simple cost per Kilowatt-hour, without finance charges				
\$0.085	\$0.220	\$0.118	\$0.085	dollars per kilowatt-hour
<b>To calculate the finance charges:</b>				
\$4,000.00	\$12,000.00	\$6,000.00	\$4,000.00	Capital investment, construction cost

25	25	25	25	Years of loan
8.25%	8.25%	8.25%	12.00%	Interest rate of loan / FIXED CHARGE RATE FOR INDUSTRIAL OPTION
\$386.52	\$1,159.56	\$579.78	\$480.00	Mortgage payment for loan per year (hand-entered from loan amortization program for Residential, Calc'd for Industrial)
\$9,663.00	\$28,989.00	\$14,494.50	\$12,000.00	Total repayment for loan over lifespan (line above times lifespan years)
<u>Total lifespan costs with mortgage payments</u>				
\$9,663.00	\$28,989.00	\$14,494.50	\$12,000.00	Capital costs (mortgage) over lifespan
\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00	Repairs and maintenance over lifespan
\$14,663.00	\$33,989.00	\$19,494.50	\$17,000.00	Total cost over lifespan
\$0.25	\$0.57	\$0.33	\$0.29	Final cost per kilowatt-hour with interest
			\$0.06	For Utilities, add 6 cents for Transmission and Distribution
			\$0.35	End cost for average retail price.

Note that profit for investors, insurance & property taxes are included in the 12% levelized fixed charge rate, in the Industrial example. 12% is used by Standard and Poor's for utilities (non-nuclear).

Other factors:

For residential non-utility examples, insurance and property costs are not included.

The maintenance costs need to be better grounded in experience, for all examples.

Deterioration Rate of Solar PV at 0.5% per year

1	1	Initial kilowatt of capacity
2	0.995	
3	0.990025	
4	0.985075	
5	0.98015	
6	0.975249	
7	0.970373	
8	0.965521	
9	0.960693	
10	0.95589	
11	0.95111	
12	0.946355	
13	0.941623	
14	0.936915	
15	0.93223	
16	0.927569	
17	0.922931	
18	0.918316	
19	0.913725	
20	0.909156	
21	0.90461	
22	0.900087	
23	0.895587	
24	0.891109	
25	0.886654	
	0.942238	Average delivery of electricity per initial kilowatt of capacity

Electricity Costs for Pima County Residents					
Now and in the Future					
Spreadsheet by Russell Lowes, www.SafeEnergyAnalyst.org, 3/17/09 DRAFT					
	<b>Reduction In</b>				
<b>Typical</b>	<b>Electricity</b>				
<b>Residential</b>	<b>Different Mix</b>	<b>Prior</b>			
<b>Consumption</b>	<b>of</b>	<b>Column</b>			
<b>KWH/Mo</b>	<b>Consumption</b>	<b>over</b>		<b>CO2</b>	<b>...See</b>
	<b>KWH/Mo</b>	<b>25 years</b>		<b>Output. . .</b>	<b>Below</b>
750	750	225000	Current consumption for a typical residence		
\$ 0.105	\$ 0.105		Cost per kilowatt-hour of electricity		
\$ 78.75	\$ 78.75		TOTAL ROUGH CURRENT COST		
0.00%	25.00%		Assumed % reduction in consumption of KWH		
750	563	168,750	New consumption level after energy efficiency program		
0	188	56,250	Energy saved per month in KWH		
<b>Projected Blend of Energy in %</b>					
0.00%	10.00%		New Solar PV		
70.00%	50.00%		Old Coal		
30.00%	25.00%		Old natural gas plants		
0.00%	5.00%		New natural gas plants		
0.00%	0.00%		New Nuclear		
0.00%	10.00%		Wind		
0.00%	0.00%		Hydro		
100.00%	100.00%				
				<b>Initial</b>	<b>New Mix</b>
				<b>CO2</b>	<b>CO2</b>
<b>Energy efficiency with new mix of solar/coal/natural gas</b>				<b>Output</b>	<b>Output</b>
			<b>Cost for Electricity for Each Source</b>	<b>grams/KWH</b>	<b>Output</b>

\$ -	\$ 13.50	\$ 4,050.00	New Solar PV	0	1,800
\$ 52.50	\$ 28.13	\$ 8,437.50	Old Coal	504,000	270,000
\$ 26.25	\$ 16.41	\$ 4,922.44	Old natural gas plants	112,500	70,313
\$ -	\$ 4.22	\$ 1,265.63	New natural gas plants	0	12,459
\$ -	\$ -	\$ -	New Nuclear	0	0
\$ -	\$ 8.44	\$ 2,531.25	Wind	0	506
\$ -	\$ -	\$ -	Hydro	0	0
\$ 0.03	\$ 0.03	\$ 0.03	<b>Energy efficiency cost per KWH</b>	616,500	354,572
\$ -	\$ 5.63	\$ 1,687.50	Energy efficiency cost per month		
\$ 78.75	\$ 67.88	\$20,363.06	Total new cost of electricity		
\$ (0.00)	\$ 10.87	\$ 3,261.94	<b>Savings/total bill</b>		
0.0%	1.4%	1.4%	Savings as % of original bill		
			<b>Savings in Total CO2:</b>		42%
			Average CO2 per Kilowatt-Hour	822	630
			<b>Savings per KWH CO2:</b>		23%
				<b>Initial</b>	<b>New Mix</b>
				<b>CO2</b>	<b>CO2</b>
				<b>Output</b>	<b>Output</b>
<b>Cost per Kilowatt-Hour</b>			Resulting KWH Used	<b>grams/KWH</b>	<b>Output</b>
\$0.240	\$0.240		New Solar PV	32	32
\$0.100	\$0.100		Old Coal	960	960
\$0.117	\$0.117		Old natural gas plants	500	500
\$0.150	\$0.150		New natural gas plants	443	443
\$0.240	\$0.240		New Nuclear	400	400
\$0.150	\$0.150		Wind	9	9
\$0.100	\$0.100		Old Hydro	10	10
\$0.035	\$0.035		Energy Efficiency	5	5
<b>KWH Consumption breakdown by source</b>					
0	56	16,875	New Solar PV		
525	281	84,375	Old Coal		
225	141	42,188	Old natural gas plants		
0	28	8,438	New natural gas plants		
0	0		New Nuclear		
0	56		Wind		
0	0		Hydro		
750	563	168,750	Total KWH/Mo		
\$ 0.105	\$ 0.121		Total Cost Per KWH		

## Cost for a Nuclear Reactor and Cost Per Person for Nuclear Energy, Capital Portion Only

### A Worksheet by Russell J. Lowes, updated 3/5/09

I have seen nuclear industry estimates have run from \$1,000-2,000 per kilowatt of installed electrical capacity to \$4,000, over the 2000-2006 period. When 2006 arrived, cost estimates increased dramatically.

Recently, some spokespersons for the industry have begun to face reality and have increased their projections dramatically, two estimates as high as \$8,200 and \$10,000 per kilowatt.

However, reactors in the late 1980s were finishing at just over \$3000, in 1980s dollars. (See Brice Smith, Insurmountable Risks: The Dangers of Using Nuclear Power to Combat Global Climate Change at [www.ieer.org/](http://www.ieer.org/))

This \$3000 does not count all the reactors that were canceled due to cost overruns, so this figure is low. Running a \$3000 price out from 1988 to 2008 with simple inflation yields (at the <http://data.bls.gov/cgi-bin/cpicalc.pl>) \$5500, rounded to the nearest \$100.

This \$5500 figure is low due to construction costs outpacing general inflation, particularly with the price of copper, steel and cement going up with increased world demand.

On top of the \$5500 in 2008, projecting out to 2020 as a completion year for a reactor at a 4% annual cost escalation rate yields \$8500.

However, more robust reactor designs with two decades worth of lessons of safety improvements has its costs. The industry is going to be required to build structures capable of withstanding large jet impacts, per post-911 rules. This will substantially increase the cost of building nukes. Additionally, "passive" cooling systems will require substantial cost increases, as massive reservoirs will be built to hold water for ECCS backup.

What will the nuclear program cost per person in the U.S. if the industry builds 1000 reactors, each averaging 1000 megawatts, in this nation?

The following table assumes that the 100 reactors are built the same year, and run for 30 or 40 years. However, no reactor has run for this long of a period at an average 85% capacity factor, so this 40-year estimate is giving the nuclear industry the benefit of the doubt.

1,350	average size reactor, megawatts
\$9,000	average cost per kilowatt of electrical capacity installed (for 2020 completion)
\$12,150,000,000	cost per plant
100	number of plants under the Bush and McCain plans
\$1,215,000,000,000	total construction cost
14.0%	levelized fixed charge rate for 30 year payback schedule

\$170,100,000,000	annual rate paid per year		
\$5,103,000,000,000	total capital payback over 30 years		
350,000,000	people in the U.S. on average over the 30-year payback period		Keystone Report/Nuclear Power Joint Fact-Finding
486	costs per person per year for loan payback		Low Cost      High Cost

If the above scenario is realized, what will the cost of nuclear power be per kilowatt-hour, for just the capital portion?

		40Yr90%	30Yr75%
\$9,000	Cost per kWe installed	<b>\$2,950</b>	<b>\$2,950</b>
14.0%	Capital payback per year/Fixed Charge Rate	12.3%	13.8%
\$1,260	Annual payback per KW, first 30 years	\$363	\$408
<b>30</b>	<b>Reactor Life in years</b>	<b>40</b>	<b>30</b>
<b>30</b>	<b>Capital Payback Period</b>	<b>30</b>	<b>30</b>
		10,887	12,229
\$37,800	Capital payback over 30 years	\$14,516	\$12,229
85.0%	Capacity factor	<b>90.0%</b>	<b>75.0%</b>
223,533	kWhe generated per kWe installed, for years in Reactor Life	315,576	197,235
<b>\$ 0.1691</b>	<b>\$/kWhe</b>	<b>0.046</b>	<b>0.062</b>
	compared with the calculations on the left:	<b>0.127</b>	<b>0.169</b>

**40 Extended 40-year reactor life in years**

298,044	kWhe generated per kWe installed
<b>\$ 0.1268</b>	<b>Capital cost/kWhe</b>

If the reactors ran at the fantasy industry figure of \$2000 per kWhe, lasted 40 years and had a 85% capacity factor:

280	Annual Payback per KW, first 30 years
<u>\$8,400</u>	<u>Capital payback over Reactor Life per kilowatt installed</u>
<u><b>\$ 0.0376</b></u>	<u>Capital cost/kWhe</u>

**Fuel, and Operation and Maintenance Costs are Projected Differently by the Following Sources**

**From the Keystone Report/"Nuclear Power Joint Fact-Finding," page 42.**

0.015	Fuel
0.023	Fixed Operating and Maintenance Cost

	0.005	Variable O&M
<b>\$</b>	<b>0.0430</b>	Total Fuel and O&M
<b>\$</b>	<b>0.1698</b>	Total All Costs/kWhe

		<b>From IEER</b> January 2008 Science for Democratic Action newsletter:
<b>\$</b>	<b>0.0430</b>	per kilowatt-hour, average projection by the Keystone Report, 2007 \$
<b>\$</b>	<b>0.0230</b>	PacifiCorp, a Western states utility company 2007 \$

		<b>From</b> Report submitted to the California Public Utilities Commission, <b>Energy &amp; Environmental Economics, Inc.</b> <a href="http://www.ethree.com/cpuc_ghg_model.html">www.ethree.com/cpuc_ghg_model.html</a>
		Fixed O&M is estimated at \$83/kW-yr, this would be
<b>\$</b>	<b>0.0111</b>	Fixed O&M
<b>\$</b>	<b>0.0012</b>	Variable O&M
		Fuel is listed as \$.78/MMBtu, with Heat Rate @10,400 btu/kwh
<b>\$</b>	0.7800	/MMBtu (million btu)
	293	kilowatts = 1 MMBtu At 3413 btu/kWh 1MMBtu
<b>\$</b>	<b>0.0027</b>	Cost of fuel
<b>\$</b>	<b>0.0150</b>	Cost of Fuel and O&M

		From Standard & Poor's "Which Power Generation Technologies Will Take the Lead In Response to Carbon Controls," May 11, 2007
<b>\$</b>	<b>0.0134</b>	per kW/yr
		\$/kWhe @ 85% Capacity factor

\*The Keystone report is considered the most accurate and up-to-date for future reactors, and will be used in the cost of calculating nuclear energy. It should be noted that there is a predicted shortage of uranium for fueling reactors, starting around 2018, with resource depletion problems getting worse over the subsequent years. Keystone does not take into account the more dire projections.

Keystone was an interdisciplinary process involving teams of researchers and writers from the nuclear industry, NGOs, etc.

**Nuclear and Other Energy Options**

**Cost Recap**

		<b>Projected Nuclear Costs per Kilowatt-Hour of Electricity Delivered</b>
\$	0.1268	Capital costs
\$	0.0150	Fuel Costs
\$	0.0230	Fixed Operation and Maintenance
\$	0.0050	Variable Operation and Maintenance
\$	<u>0.1698</u>	Total Generating Cost for Nuclear Electricity Per Kilowatt-Hour
\$	<u>0.0700</u>	Transmission and Distribution
\$	<u>0.2398</u>	Total Cost of Electricity for Delivered Nuclear Electricity
\$	0.1000	<b>Current Coal Technology Electricity Generation Cost</b>
\$	<u>0.0700</u>	Transmission and Distribution
\$	<u>0.1700</u>	Total Cost of Electricity for Delivered Coal Electricity
\$	0.0800	<b>Current Natural Gas Technology Electricity Generation Cost</b>
\$	<u>0.0700</u>	Transmission and Distribution
\$	<u>0.1500</u>	Total Cost of Electricity for Delivered Gas Electricity
\$	0.1200	<b>Solar Thermal Electricity Generation Cost</b>
\$	<u>0.0700</u>	Transmission and Distribution
\$	<u>0.1900</u>	Total Cost of Electricity for Delivered Solar Thermal Electricity
\$	0.15-0.40	<b>Solar Photovoltaic Electricity Generation, including On-Site T&amp;D</b>
\$	0.0800	<b>Wind Generation Cost of Electricity</b>
\$	<u>0.0700</u>	Transmission and Distribution
\$	<u>0.1500</u>	Total Cost of Electricity for Delivered Wind Electricity
\$	<u>0.0350</u>	<b>Cost of Energy Efficiency Per Kilowatt- Hour Saved, if Implemented On Large Scale</b>

KWH/Household for nukes and coal	2	2
capacity factor for nukes and coal	75	75
capacity factor for wind and PV	35	30
Renewable CF fraction of Nuke/Coal CF	0.466667	0.4
KWH/Household for wind and PV solar	4.285714	5
Households per kilowatt of nukes & coal	0.5	0.5
Households per kilowatt of wind & solar	0.233333	0.2

Decommissioning and Waste Cost of Surveillance System Over One Million and Ten Thousand Years

	The total number of megawatt-hours put out by a 1000 1000-MW nuclear plants over 40 years at 85% capacity factor	
1000	number of reactors	
1000	Megawatts of electricity per reactor, Design Electrical Rating	
40	Number of years	
8766	Hours per year	
85.0%	Capacity Factor/Load Factor	
298,044,000,000	Megawatt-hours of electricity for reactors	
298,044,000,000,000	Kilowatt-hours of electricity for reactors	

The federal court system has ruled that the Environmental Protection Agency can no longer use 10,000 years as a guideline for nuclear waste planning – they must now use 1 million years.

See: U.S. News & World Report, "Mired in Yucca Muck, Nuclear power is trendy again, but what about the waste?" by Bret Schulte, at <http://www.usnews.com/usnews/news/articles/061022/30nukes.htm>

Under the old 10,000 year guideline, the amount of kilowatt-hours the plants produce divided by 10,000 would equal what?

298,044,000,000,000	Kilowatt-hours of electricity for reactors
10,000	years of waste management
29,804,400,000	Kilowatt-hours of electricity for waste management.
30.0%	Reduced by the 30%, for example of energy input at the front end: mining, milling, conversion, enrichment, re-conversion, fabrication, building the plant, running the plant, short-term waste storage
30.0%	Reduced by say another 30%, with the goal of having a 40% net energy gain.
11,921,760,000	Hours per year to devote to waste management.

If the new 1,000,000 year guideline is used, the amount of kilowatt-hours for waste storage per year:

298,044,000,000,000	Kilowatt-hours of electricity for waste management.
1,000,000	years of waste management
298,044,000	Kilowatt-hours of electricity for waste management.
30.0%	Reduced by the 30%, for example of energy input at the front end: mining, milling, conversion, enrichment, re-conversion, fabrication, building the plant, running the plant, short-term waste storage
30.0%	Reduced by say another 30%, with the goal of having a 40% net energy gain.
119,217,600	Kilowatt-hours per year to devote to waste management.

How does this waste cost compare to other industrial management processes?

If the waste is kept at the reactor sites, as may be the case in the future, then there will be 104 reactor sites (if you count each reactor as a site – many reactors are at multiple-reactor sites).

10,000-Year Plan:

11,921,760,000	Kilowatt-hours per year to devote to waste management.
1,000	reactors
11,921,760	Kilowatt-hours per year to devote to waste management.

Million-Year Plan:

119,217,600	Kilowatt-hours per year to devote to waste management.
1,000	reactors
119,218	Kilowatt-hours per year to devote to waste management.

What would this value be in today's dollars at, for example, 10 cents per kWhe?

10,000-Year Plan:

11,921,760	Kilowatt-hours per year to devote to waste management.
\$0.10	
\$1,192,176	Electricity cost per year in today's dollars.

Million-Year Plan:

119,218	Kilowatt-hours per year to devote to waste management.
\$0.10	
\$11,922	Electricity cost per year in today's dollars.

**Response:** *The need for power and the economic costs and benefits of the proposed action are inquires that are, generally, outside of the scope of the environmental review. 10 CFR 51.95(c)(2). While the comment is noted, it provides no new information and, therefore, will not be evaluated further.*

**Comment:** The Ak-Chin Indian Community did receive your letter regarding the scoping comments for the Palo Verde Nuclear Generating Station license renewal application review. Based on the location of this project, the Ak-Chin Indian Community will defer comments to the Lead Tribe for Land Management area - the Gila River Indian Community.

We are still interested in being informed on the SEIS when it is completed and further development on the progress of the License Renewal Application.

Thank you for informing the Ak-Chin Indian Community about this project. If you should have any questions, please contact Mrs. Caroline Antone, Cultural Resources Manager at (520) 568-1372 or Mr. Gary Gilbert, Technician II at (520) 568-1369.  
(PV-R)

**Response:** *The comments are noted. The Ak-Chin Indian Community and the Gila River Indian Community were added to the expanded service list (those that receive the draft SEIS and the final SEIS).*

**Comment:** The Bureau of Land Management appreciates the opportunity to review and provide comment regarding the subject ER 09/549. However, the BLM has no jurisdiction or authority with respect to the project, the agency does not have expertise or information relevant to the project, nor does the agency intend to submit comments regarding the project.  
(PV-Z)

**Response:** *The comment is noted. However, the comment provides no new information, and therefore will not be evaluated further.*

**Comment:** My name is Mary Widner, I live in the community. I was wondering, on the impact study, does the future growth the developers have planned for this area affect this in any way or can the NRC back them off some?

What affect does the amount of people that they are planning on putting out here how does that affect this?

Is there any type of system set up that they have to be so far away from Palo Verde in their building? You know, like two miles, 7 five miles.

Because, you know, Luke here they built right up to almost the boundaries. And they've caused so much problems trying to shut Luke down, we don't want that to happen out here.

Well, you know, I would like to be sure that Palo Verde is going to be here. And that this is not – just because we have development that's been brought in and planning development of people out there in this local valley doesn't affect Palo Verde.

No. Palo Verde has not encroached on anybody. I'm just concerned that like Luke where the developers have come out, planted homes and subdivisions and developments and now they're complaining. Well, they knew that air base was there, they know Palo Verde's here. But they -- that doesn't slow them down. I mean, they plan on planting close to a little over a million people in this Valley inside a ten mile radius. We would like to know, can NRC slow that down and keep them to some type of bay so that Palo Verde does exist and continue to operate without their interference? (PV-A)

**Response:** *The comment is noted. The NRC has no role in land development planning in the area near PVNGS. The comment provides no new information, and therefore will not be evaluated further.*

**Comment:** The startling revelation that the NRC is proposing to allow an exemption to the regulation requiring the written and operations test for the SRO at Palo Verde by a FONSI brings forward the question of NRC honesty and integrity. There is a question now whether the NRC is acting in a criminal manner in these regards. This must be examined fully and openly. The NRC should examine fully in the EIS the probability and likelihood that the NRC has exhibited now that it has "unclean hands" and that it is evidently a corrupt agency and not capable of regulating Palo Verde. In the course of this investigation and analysis, the NRC should examine whether the decision to lift the scrutiny of Palo Verde in spring 2009 was merely a cynical move to assist with the relicensure process and if it was the agency yielding to political pressure, or if the NRC really did determine, after four to five years of extra scrutiny and concern, that suddenly the operators of Palo Verde had indeed changed their corporate culture and were worthy of less scrutiny. Included with this analysis is the likelihood or increased probability that the NRC's actions will help cause a serious problem at Palo Verde leading to extra charges for ratepayers, at a minimum, or the worst, an incident releasing radiation in unpermitted amounts.

(PV-AB-9)

**Response:** *The comment is noted. The comment provides no new and significant information and, therefore, will not be evaluated further in relation to the SEIS.*