BOWIE POWER STATION

COCHISE COUNTY, ARIZONA

Docket No. L-00000BB-01-118

AIR QUALITY

PREPARED REBUTTAL TESTIMONY

OF

STEPHEN M. BRITTLE

December 10, 2001

Q. Mr. Brittle for the record please state your name and address.

A. My name is Stephen M. Brittle. I reside at 6205 South 12th Street in Phoenix, Arizona. My telephone numbers are (602) 268-6110, fax 268-0915, and my email is dwaz@fastq.com

Q. Mr. Brittle please give the Siting Committee and the Applicant your background, experience and duties.

A. I am Co-Founder and President of Don't Waste Arizona, Inc. (DWA), a statewide non-profit environmental organization, since 1990. I am also the Co-Chair of the Concerned Residents of South Phoenix, November 1992-present.

- I have a Bachelor's of Arts Degree, University of Nevada, LasVegas, which I received in 1973. I have been honored in Who's Who Among American College Students in 1973.
- I have had special Clean Air Act classes from Arizona State University's Center for Environmental Studies. I took the 16-hour Training Seminar on the Clean Air Act, April 8 and 9, 1998.
- I have knowledge of the Pollution Prevention Act and its planning requirements, also the Clean Air Act, RCRA, CERCLA, and EPCRA. I have conducted litigation quality research, reviewing public record files, including air permit files, for Clean Air Act, EPCRA and PPA compliance.
- I was a presenter at a session at the EPA's TRI conference in September 1997 as a "Success Story."
- I was an Environmental Justice representative on the EPA's Common Sense Initiative's Computers and Electronics Sector Subcommittee.
- I have been a participant and speaker at several NASTTPO (National Association of SARA Title III Program Officials) annual conferences, 1999-2001.
- I have been a participant in EPA's Compliance Assistance Conference 2001.
- I have been a participant in the RIITE Project (Metal Finishing Sector) of the USEPA's Common Sense Initiative, which is designed to reduce the redundancy and reporting burden on industry, and involved reviewing and analyzing all environmental permits and regulatory oversight.
- I have been involved in commenting and participating in Intel's Project XL and two EPA XL roundtable discussions. I have been a member of Intel's Community Advisory Panel and Environmental Health and Safety Subcommittee, including being part of the stakeholder team negotiating Intel's XL renewal in 2001.
- I am a member of the Maricopa County Local Emergency Planning Committee
- I participated on the Environmental Externalities Task Force of the Arizona Corporation Commission, which examined monetizing the environmental effects of electrical energy production and distribution.
- I helped organize the October 1996 Clean Air conference with the League of Women Voters.

As DWA President, my duties have included:

- Working with member organizations that included two native American groups, an African-American group, and a Hispanic-American group;
- Research, preparing litigation strategies and litigation for citizen suit enforcement of federal environmental laws (Clean Air Act, EPCRA, RCRA, Clean Water Act) - heavy case load, with about 90 cases successfully completed;
- Commenting on environmental permits;
- Testifying at the state legislature;
- Participating on a variety of environmental committees and EPA task forces;
- Grassroots organizing;
- Promulgation of articles and distribution of newsletters/publications about environmental issues;
- Frequent speaking and teaching engagements;
- Preparing press releases and press conferences.

I have reviewed air permit applications and challenged permits for Don't Waste Arizona, Inc. since 1992, including:

- 1992 - BFI Medical Waste Incinerator-fined $250,000;
- 1994-1998 Reviewed dozens of air permit files and facility emissions reports as part of the investigation and workup of EPCRA citizen suits.
- 1998 - Background research on Sumitomo Sitix Clean Air Act violations - largest fine in county history, > $300,000
- 1999-2001 Reviewed and commented on several power plant applications and permits:
- APS West Phoenix, S99-013 West Phoenix Expansion and its Title V permit
- Pinnacle West V99-013, (APS) Redhawk
- Duke Energy, V99-014 Arlington Valley Energy
- V99-015 Harquahala Generating Co.
- SRP S00-016 Kyrene Expansion (former Oasis)
- Sempra Energy Resources, V99-017 (Mesquite Power)
- Sundance Energy Project, Pinal County.
- Toltec Power Station LLC, Pinal County.

Thank you, Mr. Brittle. Have you had an opportunity to review the application for Certificate of Environmental Compatibility regarding Air Quality?

A. Yes

Q. In the application, it's stated on page five (5) 4.1.1, third paragraph, that the plant will be fueled by clean natural gas. If this is so, then why are emission control systems needed?

A. Natural gas is a cleaner burning fuel than coal, but it still pollutes. All of the criteria pollutants will be emitted in enormous quantities, and the Clean Air Act requires such major sources of pollution to control these emissions with the Best Available Control Technology (BACT).

Q. How would you characterize the particulate matter emissions of PM from a natural gas-fired power plant as opposed to a coal or fuel oil fired power plant?

A. Almost all of the particulate matter is PM1--one tenth the size of PM10--and much more effective at light extinction. Therefore, it must be calculated/modeled in a different way.

In addition, with the facility using the SCR technology and releasing so many tons of ammonia, there is the issue of secondary PM10. Unreacted ammonia emitted at the stack reacts with sulfur trioxide and nitric acid downwind in the atmosphere potentially forming very large amounts of PM10. The resulting particulate matter is generally referred to as secondary PM10 and cannot be readily estimated with available models, but should be considered as a collateral impact of SCR. The impact of ammonia emissions on visibility has been documented in different studies. The visibility analyses for this facility should consider the formation of PM10 downwind of the project and include this in estimating visibility impacts.

Ammonia dissolves in cloud water to form ammonium ions or reacts with acids to form neutral ammonium salts. When this ammonia returns to earth in precipitation or dry fallout, it can contribute to the acidification of terrestrial soils and surface waters.

The ammonium ions are primarily taken up by plants, which release a hydrogen ion, contributing to acidification. Ammonium ion may also be nitrified to nitrates by microbes. This process will also release hydrogen ions, contributing to acidification. Thus, ammonium deposition usually contributes to chronic acidification. It can be an especially significant contributor to episodic acidification when deposited on snow where microbial nitrification can occur but plant uptake is not possible. Alternatively, when deposited on water, ammonium ions or ammonia may be taken up directly by aquatic plants, undergo microbial nitrification contributing to acidification, or undergo subsequent microbial denitrification increasing the pH of the water. The impact of the proposed facility on local water resources and ecosystems through the impacts of acid deposition must be closely scrutinized and evaluated.

Q. In this same paragraph it also states that Nitrogen Oxide (NOx) emissions will be reduced by in-situ combustion control system. To the best of your knowledge is this the best control technology available?

A. No.

Q. Mr. Brittle, on page nine (9) section 4.1.2.4. can you please read this assessment and comment on its conclusions?

A. CEM (Continuous Emissions Monitoring) are required for this type of facility, so assurances that the facility will use CEM are certainly not above and beyond minimum requirements. There are a variety of issues with the use of the SCR technology also.

Q. Does this meet Best Achievable Control Technology (BACT)? Or Lowest Achievable Emissions Rate (LAER)?

A. The 3.0ppmvd for NOx doesn't meet either standard, actually. NOx limits of 2.0 ppm to 2.5 ppm averaged over 1 hour have been permitted in attainment areas subject only to BACT (e.g. Sumas, Three Mountain Power, Sutter, Moss Landing, Morro Bay). Additionally, EPA Region 9 has commented that BACT for NOx "should be set at 2.0 ppmvd on a 1-hour rolling average" for the 600 MW Morro Bay project, located in an attainment area. Since BACT is an ever-evolving standard as control technologies advance, BACT for NOx should easily be held to be 2.0ppmvd. Permits issued in 1999 and 2000 have held to this standard.

Q. How would these limits apply in an attainment zone? What accumulative levels of emissions are allowed before attainment becomes non-attainment? How large are these zones, would the smelters in Morenci, Chino and the coal units at AEPCO be included in this zone?

A. LAER is required in areas where there is non-attainment for a criteria pollutant; otherwise BACT is the standard for attainment areas. For example, the Phoenix metro area is non-attainment for Ozone, Particulate Matter, and Carbon Monoxide. LAER must be used for facilities in the Phoenix metro area non-attainment area seeking major source or Title V air pollution permits for facilities that will emit Ozone, Particulate Matter, and Carbon Monoxide. Once there have been enough exceedances of the National Ambient Air Quality Standards (NAAQS) in an air planning area, such as the Phoenix metro area, then the area is reclassified from attainment to nonattainment. The non-attainment area can be very small, like the town of Hayden is for SOx, or very large, like the Phoenix metro area. There are no certain boundaries, just the area where there are exceedances of the NAAQS and hence, nonattainment. The smelters in Morenci, Chino and the coal units at AEPCO would not likely be included in this zone, but impacts from the proposed power plant and additional emissions from these sources need to be modeled to determine if there are likely going to be exceedances of the NAAQS from the cumulative effect of all of these.

Q. When examining the Table B-4-1, ESTIMATED ANNUAL EMISSIONS, is there anything unusual you noticed?

A. (1) I am skeptical about the validity and accuracy of the projected emissions. Because the facility will use the SCR (Selective Catalytic Reduction) technology, which entails the use and emissions of many tons of ammonia, I sincerely doubt that the PM10 emissions will be what is represented. Unreacted ammonia emitted at the stack reacts with sulfur trioxide and nitric acid downwind in the atmosphere potentially forming very large amounts of PM10. The resulting particulate matter is generally referred to as secondary PM10 and cannot be readily estimated with available models, but should be considered as a collateral impact of SCR. The impacts of ammonia emissions on visibility have been documented in different studies. The visibility analyses for this facility should consider the formation of PM10 downwind of the project
and include this in estimating visibility impacts.

(2) Further, it seems peculiar that there is no mention of Hazardous Air Pollutants, or HAPs. When examining the applications and permits for other similar power plants in Arizona, I have always seen a discussion and analysis of the HAPs. Here, there was no mention. The project must comply with federal hazardous air pollutant regulations under Title V of the Clean Air Act (42 USC 7412), which have been adopted into Arizona's Title V program.

Q. Why is that HAPs information important?

A. If the facility will emit more than 10 tons of a single HAP, or 25 tons of all HAPs, it must meet a new standard, Maximum Achievable Control Technology (MACT) to reduce its HAPs. If the facility were going to emit more than 25 tons of total HAPs, which might potentially occur, then other control technologies would have to be used.

Q. What are the sources of HAPs and how are they calculated?

A. HAPs emissions are estimated by multiplying an emissions factor in pounds of HAPs per million cubic feet ("lb/MMcf") or million Btus ("lb/MMbtu") combusted by the amount of gas combusted in the turbines and duct burners (using boiler emissions factors) and the combustion turbines. Further, during startup and shutdown, the HAPs emissions would be greater.

Another source of HAPs is from the cooling tower drift. There was a slight mention of PM from drift from cooling towers in PROJECT EMISSIONS, and there is reference to "emissions expected from startup and shutdowns of the turbines, as well as from normal turbine emissions." Yet the cooling towers are a large source of particulate matter, and some of the particulate matter is considered HAPs. An example of this is arsenic. Since arsenic is often in local groundwater in high levels, the arsenic in the cooling tower water drift become tiny particles of arsenic salts, which are HAPs as arsenic is a HAP. Other metals are also HAPs, such as barium, cadmium, chromium, cobalt, lead, nickel, etc., and they would also be present in the cooling tower water and the drift. I have seen other similar facility permits applications that do not properly account for these HAPs and PM10.

How much drift is there, usually?

A. Drift is usually 0.0002% of the flow rate. The water used for the cooling towers would have to be tested for levels of metals to determine what is actually in the PM10 that is generated or caused by the cooling tower drift, and calculations made after that. Then, in projecting HAPs (Hazardous Air Pollutants) emissions, there has to be a determination about what percent of each HAP (arsenic, barium, cadmium, chromium, cobalt, lead, nickel, etc.) is from emissions from cooling tower drift.

Q. Would this facility be required to meet MACT standards?

A. The facility could very likely generate enough HAPs to require MACT standards. Other similar projects, when all HAPs sources have been considered and calculated, particularly when cooling tower HAPs emissions are added in, have been shown to exceed the 25 ton/year HAPs MACT threshold.

Q. Are there waste-related issues associated with the cooling towers and facility water use?

A. Yes. There is mention of water handling and (water) treatment facilities on-site. The pretreatment of the water in ponds to settle out and remove sediments, metals, and other contaminants will create a waste stream that may be hazardous waste, or just solid waste, but will be a considerable waste stream nonetheless. The disposal of this waste will involve its own significant truck traffic. The disposal of this waste will also potentially impact local landfills or hazardous waste disposal facilities. If it is a hazardous waste, then there will be environmental justice considerations as all of the hazardous waste facilities in Arizona that import waste generated off-site are in low-income and minority communities.

There would likely be impacts from these ponds, also. The ponds, being the only body of relatively fresh water in a desert environment, would attract wildlife. Fencing would not keep birds and burrowing rodents away. The concentrations of selenium, arsenic, lead, fluoride, and other substances in the ponds will likely exceed levels that adversely affect wildlife that ingest pond water, brine shrimp, and other pond organisms. The metals in these ponds maybe alkylated by microorganisms in pond waters and sediments, converting them into volatile and highly toxic forms that could be emitted from the surface of the pond or bioaccumulate in the food chain, adversely affecting wildlife with access to the ponds.

Q. Regarding the Selective Catalytic Reduction (SCR) technology, what are some of the additional environmental risks and hazards associated with this?

A. There are extra risks from the off-loading, storage on-site and transport of aqueous ammonia over local roads and highways; impacts on visibility, acidification of soils and waters, and secondary PM10 formation.

Q. What can you tell me about the hazardous materials incident response capability of Cochise County?

A. I attended a meeting of the Arizona State Emergency Response Commission in Cochise County, and there was quite a discussion of the response capability problems in this rural county. Response is handled by the fire department of jurisdiction, which in this case lacks the proper equipment, training, and resources to manage a spill of aqueous ammonia either in transit or at a fixed facility. There is already another facility in Bowie (Cochise County Farmers Association) that has a large quantity of anhydrous ammonia onsite (up to 40,000 pounds). The Bowie Fire Department is not equipped or prepared to handle this, however. In November 2001, there was a hazmat incident in Bowie, and the Arizona Department of Public Safety had to respond, since the Bowie Fire Department lacks the proper training and/or equipment.

Q. What would happen if there was a catastrophic spill or release of ammonia along the transportation route of the ammonia to the Bowie facility or at the site itself?

A. If during transportation there was a spill of the aqueous ammonia on Interstate 10, the Arizona Department of Public Safety (AZDPS) would respond. If during transportation there was a spill of the aqueous ammonia on local roads, the Cochise County Sheriff's Department could not respond. Due to the lack of resources, there would be nothing the AZDPS or Cochise County Sheriff's Department could do except close down the freeway, local roads and evacuate people until the cloud of ammonia dissipated. Animals in the affected area would not survive, and as there would be no way to notify people near the spill site, they would be in a dangerous position as well. This could be somewhat mitigated by educating the public along the transportation route and near the fixed facility about chemical hazards, shelter-in-place strategies, and instituting an emergency notification system. There would be significant truck traffic involved with supplying the site with aqueous ammonia, certainly at least 150 trucks per year.

Q. What can you tell me about aqueous ammonia and how it behaves when spilled or released?

A. Aqueous ammonia can have a two-phase reaction, which means that the ammonia can be in a liquid phase, then suddenly in a vapor stage, which makes it almost explosive in its ability to change phase suddenly. Aqueous ammonia is a very unpredictable chemical to model, so there is a great deal of uncertainty in the modeling. Conservative estimates are best when public health and safety are at stake.

Q. How would a responding fire department handle a spill of aqueous ammonia?

A. Normally, a responding fire department would spray water on the aqueous ammonia spill until the liquid could be pumped into a tanker, but it is doubtful that the Bowie Fire Department even has this equipment, even if it could respond. Depending on the stability of the weather and wind conditions, a spill of aqueous ammonia from an 8,000 gallon tanker (typical ammonia tanker) could have impacts as far away as 7.6 km, but more likely, a 1-2 km area would be affected.

Q. How did you determine the potential off-site consequence?

A. I have reviewed the potential off-site consequences using ALOHA (Aereal Locations of Hazardous Atmospheres), a computer modeling program developed by the USEPA, NOAA, and the National Safety Council. For purposes of my modeling, I assumed the aqueous ammonia would have a 19% concentration.

Q. Why did you choose that concentration?

A. I chose this because of the regulatory limit set by the Clean Air Act 112r program, also known as the Risk Management Program (RMP). Facilities using 20% or higher concentrations of aqueous ammonia and storing over 20,000 pounds of the chemical must participate in the RMP program and develop special emergency planning measures. As a result, power plants using SCR in Arizona have claimed they will be using 19% aqueous ammonia to avoid this requirement. To have a lower concentration than the 19% would result in more truck traffic and higher costs.

Q. What did you conclude from your review?

A. My analyses show that concentrations of ammonia high enough to cause significant health impacts would occur at large distances from the roadway or the power plant site in the event of a catastrophic spill or release.

Q. Are there other issues associated with the use of the SCR technology?

A. Yes, several:

1) No agency in Arizona or even the EPA has the authority to permit or regulate emissions of ammonia. Ammonia is not a HAP, and it is not a criteria pollutant with a NAAQS promulgated for it. There is no federal-level permit authority for this pollutant. Ammonia releases to the air have to be reported by certain facilities to the Toxics Release Inventory.

2) Unreacted ammonia emitted at the stack reacts with sulfur trioxide and nitric acid downwind in the atmosphere potentially forming very large amounts of PM10. The resulting particulate matter is generally referred to as secondary PM10 and cannot be readily estimated with available models, but should be considered as a collateral impact of SCR. The impact of ammonia emissions on visibility has been documented in different studies. The visibility analyses for this facility should consider the formation of PM10 downwind of the project and include this in estimating visibility impacts.

3) Ammonia dissolves in cloud water to form ammonium ions or reacts with acids to form neutral ammonium salts. When this ammonia is returned to the earth in precipitation or dry fallout, it can contribute to the acidification of terrestrial soils and surface waters.

The ammonium ions are primarily taken up by plants, which release a hydrogen ion, contributing to acidification. Ammonium ion may also be nitrified to nitrates by microbes. This process will also release hydrogen ions, contributing to acidification. Thus, ammonium deposition usually contributes to chronic acidification. It can be an especially significant contributor to episodic acidification when deposited on snow where microbial nitrification can occur but plant uptake is not possible. Alternatively, when deposited on water, ammonium ions or ammonia may be taken up directly by aquatic plants, undergo microbial nitrification contributing to acidification, or undergo subsequent microbial denitrification increasing the pH of the water. The impact of the proposed facility on local water resources and ecosystems through the impacts of acid deposition must be closely scrutinized and evaluated.

4) The SCR catalyst is vanadium pentoxide, which is on the CERCLA list of extremely hazardous substances. The spent catalyst is a hazardous waste under RCRA and must be disposed of as such. Although the catalyst is normally returned to the vendor for disposal, it eventually must be disposed of by some entity as hazardous waste. This simply transfers an air emissions problem into a long-term hazardous waste disposal issue.

Q. Are CEM (Continuous Emissions Monitoring) required for this type of facility?

A. Yes, so assurances that the facility will use CEM are certainly not above and beyond minimum requirements.

Q. What concerns do you have about the PSD language?

A. Exhibit B-4, AIR QUALITY states, "An air quality impact analysis must be conducted and the results of the analysis must show that the project will not cause or contribute to an exceedance of any National Ambient Air Quality Standard (NAAQS) or Prevention of Significant Deterioration (PSD) increment." This is a bit inaccurate because the PSD requirements are triggered when a facility's annual emissions of certain pollutants are going to be above certain amounts. Any facility adding the amounts of NOx, SO2, PM, VOCs and CO emissions that this facility will emit will have to conduct a PSD analysis. A new facility in an attainment area with potential annual emissions of more than 25 tons of PM, 15 tons of PM10, 40 tons of SO2, 40 tons of NOx, 40 tons of VOCs, 100 tons of CO, 0.6 tons of elemental lead, 3 tons of Fluorides, 7 tons of Sulfuric Acid mist, 10 tons of Hydrogen Sulfide, and/or 10 tons of Reduced Sulfur Compounds must conduct the PSD analysis. The determination about whether a PSD analysis is required is accomplished by examining the facility's potential to emit, which involves the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. A facility may, in an attempt to escape PSD applicability, improve controls to reduce emissions and/or limit hours of operation to reduce the potential to emit.

Q. Exhibit B-4, AIR QUALITY further states, "Further, the analysis must show that the project will not have an adverse impact on air quality related values such as visibility, wildlife, or vegetation in specially protected areas (Class I area)." What concerns does this language bring?

A. The impact on visibility is mentioned, but the actual methodology and calculations are not mentioned. I would have to question what modeling methodology was used or will be used to determine the emissions from a natural gas-fired power plant and their effect on visibility.

Q. How would you characterize the particulate matter emissions of PM from a natural gas-fired power plant as opposed to a coal or fuel oil-fired power plant?

A. Almost all of the particulate matter is PM1--one tenth the size of PM10--and much more effective at light extinction. Therefore, it must be calculated/modeled in a different way. In addition, with the facility using the SCR technology and releasing so many tons of ammonia, there is the issue of secondary PM10. Unreacted ammonia emitted at the stack reacts with sulfur trioxide and nitric acid downwind in the atmosphere potentially forming very large amounts of PM10. The resulting particulate matter is generally referred to as secondary PM10 and cannot be readily estimated with available models, but should be considered as a collateral impact of SCR. The impacts of ammonia emissions on visibility have been documented in different studies. The visibility analyses for this facility should be consider the formation of PM10 downwind of the project and include this in estimating visibility impacts.

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Q. Are there issues regarding noise associated with the facility?

A. Yes. There will be noise caused by the cooling towers, duct burners, and other general operations of the facility. The surrounding area and desert will be permanently disturbed. Firing ducts can sound much like a jet engine, and the sudden, repeated firings of duct burners will be very disturbing to a large area, affecting nearby humans, and certainly the wildlife in the area, especially those who use their hearing to hunt or avoid being hunted successfully.

Mr. Brittle, thank you for coming in today and presenting your testimony. Is there anything else you would like to comment on?