



The Sam Nunn Security Program at Plant Jack McDonough in Smyrna, Georgia

### **The Sam Nunn Security Program Visits Plant McDonough**

On February 27, 2007, the fellows and faculty of the Sam Nunn Security Program toured Plant Jack McDonough in Smyrna as part of a teaching module on energy security that they have been participating in this semester. Because ensuring an adequate energy supply into the future is one of the many problems requiring both scientific advancement and sound policy decisions, it is among the issues explored by the program. Several challenges make this task no minor feat including: increasing global demand, geopolitical instability in many energy exporting nations, and concerns about the effects of environmental degradation.

Before the tour the participants were briefed by Steven Ewald, a nuclear physicist currently with Georgia Power's Environmental Affairs department, about what Georgia Power is doing to limit pollution as they increase electricity production to meet the demand of a growing state. Plant McDonough will soon begin construction on cooling towers so that it can return water into the Chattahoochee River at approximately the same temperature at which it is withdrawn. Currently, and since the plant's inception, water has generally been returned a few degrees warmer than it is withdrawn and this apparently minor temperature change can impact the river's ecosystem. Plant McDonough is also planning to transition from a coal power plant to a combined cycle natural gas plant.

Combined cycle refers to the use of both a steam turbine (as is used in the current coal plant) and a gas turbine that draws in air and ignites it in conjunction with gas – conceptually not unlike some aircraft engines. This process will be phased in one unit at a time. There are currently two steam turbine units whose steam is all generated from the heat obtained by burning coal. One at a time, the coal furnaces will be replaced by gas turbines. Plant McDonough is too integral to Atlanta’s electricity production to have both plants down simultaneously. The natural gas operation will produce 1/3<sup>rd</sup> more power for the same amount of fuel.



One of the two turbine units at Plant McDonough

Ewald spoke at length about the problem of measuring and containing mercury emissions, which is proving much more difficult than Nitrogen Oxide and Sulfur Dioxide - the historical pollutants of concern when considering fossil fuel plants. He also touched on the issue of carbon dioxide. While much thought is being given to how this gas might be captured and stored in underground caverns, it appears this is far from becoming a widespread reality. Ewald informed the group that hydroelectric power was used at its maximum capacity in Georgia (as it is throughout most of the country.) He also spoke of the slow process of working to increase the number of nuclear plants. In the aftermath of Three Mile Island there has been almost a *de facto* moratorium on nuclear plant production. While there is a widespread belief that nuclear must be an increasing part of America’s energy future because it is greenhouse gas free and is quite economical over the long-run, there is also resistance to increasing the number of nuclear plants among some elements of society as well because of concerns about waste disposal and fissile material accountability. Ewald spoke of Georgia Power programs to support energy conservation, such as conducting energy audits and giving out low energy light bulbs.

The first stop on the tour was a trip to the top of the plant to get a birds-eye view of the surrounding area. This view included a massive coal pile where they can store a month's worth of the plant's fuel. Furthermore, there was a long line of loaded coal cars on the plant's railroad siding. There was also a massive pile of ash in the distance. Ash is a major byproduct of plant operations. In most cases the ash is sold on the open market, primarily for use as a component in concrete. However, much of the ash produced at this plant has too high a content of coal remnants to be valued for such purposes. As high as we were, the building's roof was overshadowed by the smokestack next to it. Also of note was the construction going on at the plant to advance the changes mentioned above. Yet perhaps the most interesting thing to see was the relative proximity of the high-rise office buildings and upscale condos that provided an interesting juxtaposition to the industrial landscape of the power plant.



Field trip participants around a used pulverizer wheel that makes coal into powder

Next, we traveled through the control area of the facility. The primary control room is modern with much of the information conveyed by way of computer screens and LCD displays. However, we walked by many panels that had probably been in the plant since its opening in the 1950s. Much of the wall space in this area was covered with mechanical drawings for various plant components. Next, participants were able to peer through a 10 X 4 inch window into the furnace where they could see coal powder riding strong air currents as it swirled inside the furnace's interior to be consumed. The interior glowed orange.

It is interesting to note that opening the doors of the plant inevitably met with a strong wind gust even on this relatively calm day, and the engineer guiding our tour said that in the winter the plant's interior is often much colder than the outside. Both of these phenomena are caused by the large amount of air that is constantly being drawn into the plant for combustion. The floors throughout most of the plant building consist of steel gratings rather than solid floors, and this is to aid in this air circulation. The penultimate stop on the tour was a trip to the basement where the group was able to see the machines that pulverize the coal and feed it up toward the furnace. Also in the basement, the group saw the five foot diameter pipe in which water is drawn into the plant for conversion to steam. Before leaving the plant, the participants were shown the steam turbines in greater detail. Throughout the trip ear protection was required, so before returning to Tech the group made another stop at the training trailer for a brief Q&A session that could not be conducted in the din of the power plant.