Source of energy under western soil

By SCOTT McCLEARY
Daily Collegian Staff Writer

Beneath 11 million acres of three Western states lies a potential energy source that could supply the United States' total energy needs for over 100 years, at presents rates of consumption, according to Tony Pontello, program manager of the Energy Conservation and Resource Development division of the U.S. Department of Energy in Philadelphia. That energy source is oil shale.

One ton of oil shale would give up to 140 gallons of oil. The oil is not of as good a quality as the conventionally drilled oils, and the cost is high to produce it, but there is a tremendous supply, Pontello said.

The shale is crushed and then heated, in a process known as retorting, to extract the oil from the rock. Extra refining is then needed to get particles out of the oil, he said.

"France was the first to produce the oil from shale," Pontello said, "and the United States first started mining oil shale in 1860, two years after the first oil well was drilled in this country."

There is an estimated 1.8 trillion barrels of oil locked up in the shale in Colorado, Utah and Wyoming, he said. By 1985 we could be producing up to 600,000 barrels a day.

Environmental effects are a factor in the production of shale oil, Pontello said, There is a lot of dust produced when they mine the oil shale, and there are laws against the dust.

The waste rock can be used for fill, and then plants can be grown on the fill, he said. There is a drawback — the fill has to be heavily watered, and there isn't that much water where the shale is mined.

Another source of potential energy is the wind, according to Pontello. The United States had a windmill industry until the 1930s when electrcity was made available to the remote farmer, he said.

Windmills for electric power for private use range in price from $800 to $26,000 and can generate from 200 to 6,000 watts, he said.

"The wind is a very viable energy source," Ted Ankrum, of the office of the assistant secretary for Resource Applications, said.

Right now the government is working on the technology to exploit the wind, he said. The government spent $84 million on development of that technology last year, according to Ankrum.

Wind can be used for power anywhere where the average wind speed is greater than 14 miles per hour, he said. This is in any mountainous area, he said. The only place that the wind isn't a real source for power is on the Great Plains and in the Southeast.

A more limited but valuable source of energy is geothermal energy. This form of power is limited to the site of geysers or hot springs which supply steam to turn turbines that produce electricity, Pontello said.

Geothermal energy is used around the world for such things as heating green houses, drying lumber and heating homes, he said. It is potentially valuable, abundant and generally pollution-free, the only pollutant produced being sulphur.

Geothermal energy is not as profitable if used to produce electricity in the East, but the potential for heating dwellings is still there, Hubert Barnes, professor of geochemistry, said.

If a well is drilled deep enough, hot water can be found, he said, and if it is hot enough and plentiful enough, homes can be heated with it.

Nuclear waste disposal researched

By ELIZABETH FOX
Daily Collegian Staff Writer

Researchers here at Penn State are now developing methods to convert the most dangerous nuclear wastes into synthetic forms so stable that they will not decompose under the worst possible geological conditions.

According to Gregory J. McCarthy, Penn State researcher, we will soon be able to tailor waste forms for great stability in many types of geological hosts. At the present time, scientists are testing existing forms to evaluate and improve their stability in salt and other geological repositories.

"We have already determined the strengths and weaknesses of the half-dozen synthetic waste forms currently being considered worldwide," McCarthy said.

McCarthy, along with other Penn State researchers, has designed a synthetic mineral form which is "proving to be quite stable and may even be near equilibrium with silicate rocks under the worst hydrothermal conditions," he said.

These "worst case hydrothermal conditions" would exist if water were to come in contact with the nuclear waste form due to the combination of high pressure and radioactive heat during the first few hundred years of burial. This period is the most dangerous time during burial.

"We have great confidence with extreme stability and are now looking to nature to the way she has built rocks," McCarthy said. "In two billion years some of nature's rocks have not dissolved. There is evidence in nature that these rocks can stand the worst nature can give out," he said.

Two types of man-made forms are being developed by scientists for disposing of this high-level nuclear waste: glass-like solids and synthetic mineral ceramics which mimic rocks in nature. The glass form is older and better developed and is now being planned for burial. The synthetic forms McCarthy has been developing have been tested in the laboratory and have proved to be quite stable. In tests lasting up to six months at 300° C, the ceramics showed very little alteration or release of hazardous elements.

There has been a substantial amount of funding from the government for nuclear research, and McCarthy says that there has been steady funding for the last six years at the University. He predicts that there will probably never be a lack of funds for this type of research.

"Nuclear research is a major effort at Penn State. If you talk to sporting people and mention Penn State, they think of Paterno and the team. But if you talk to ceramic and nuclear scientists and mention Penn State, they think of research in nuclear waste disposal," McCarthy said.

When asked if research was changed by the Three Mile Island accident, McCarthy said that it is not likely to effect their research because there is nuclear waste to be disposed of at all times. This waste is not currently being disposed of in a permanent fashion.

The location for these waste disposal sites would have to be geographically isolated. The main consideration would be that no mineral deposits were located in the immediate area. There must also be stable, dry rock formations under the ground and it must be in a location where there are no volcanos or earthquakes.

"The states would have to give their OK, but if we can prove the stability of the waste forms we are developing, we can assure them that they won't have to worry about leakage," McCarthy said.

Coal cheaper, but has its drawbacks

University, nation considering coal for future

By BECKY JONES
Daily Collegian Staff Writer

Coal, a fossil fuel used by man for many years to provide energy, is one of the major sources of fuel for the University. According to Joseph Bennett, spokesman of public, information, Ralph F. Spearly, director of physical plant maintenance, had said 80-85 percent of the fuel burned by the University for energy is coal.

The main purpose of coal use is to supply steam heat to the University's buildings, Spearly said. The ready availability of the steam allows some of it to be used to produce electricity, supplying approximately 16 percent of the University's electricity, he said.

In supplying over three-quarters of the University's burned fuel, coal has a number of advantages. First, coal is cheaper than either oil or gas, the University's other fuels which are burned, Spearly said. He added coal is much more readily available in this area than are oil or gas.

However, the use of coal also has its drawbacks. Spearly cited excessive pollution and ash residue as the major problem of coal use.

The pollution factor affects not only the University's method of use but also the amount it uses. Spearly said coal is overfired in order to meet federal pollution regulations. This means it is burned at the same time as oil or gas to cut down on the amount of sulfur released into the air.

Federal pollution regulations have been a cause of the decrease in the University's use of coal, he said.

Federal regulations have also accounted for a decrease in coal production, according to Leonard Gross, general manager of public relations at Consolidation Coal Company in Pittsburgh.

Gross cited the 1960 Mine Regulation Act which put more people in the mines, and other regulations, such as requiring extra time to be spent mining each ton, as specific examples.

These combined conditions contributed to a decrease in production of almost 40 percent since 1970 in tons mined per person per day, Gross said.

Not only has production been down, but demand has also declined. Gross said limits on the types of coal that can be burned, refusal of companies to stock up on coal reserves, and a decline of prosperity in the steel business are all contributing factors in the lower demand for coal.

Supply and demand are not the only issues of the day surrounding coal. Safety is also a major concern. Such dangers as methane gas, coal dust and black lung, although much less common than in the past, are constant threats to miners' lives, Gross said.

In 1977, 128 people died in bituminous coal-related incidents. On the optimistic side, this number is down from previuos years in a continuing decrease in mining-related deaths.

Looking ahead, what is the future for coal, on campus and nationally? Spearly said no coal shortage is foreseen for the University in the near future and did not comment on possible future alternatives.

Gross predicted the future of coal to be synthetic. He said it will have to be converted to a gas or liquid to burn cleaner. At present, though, there are no commercial conversion plants in this country, he said.